COAL AGE

Vol. 4. NEW YORK, NOVEMBER 29, 1913 No. 22

Said a superintendent: "When the good ladies of our community decide that they need a new church building or school house, I become interested and offer them encouragement. When they come to me with a request to head the subscription list (and an impression that I am good for at least one-half of the total), I remind them tactfully of the proverb which teaches that 'when an ass bears too light a load, he wants to lie down.' "

Churches are beginning to realize that it is important to have each member contribute something; the person who fails to make a contribution, generally fails to take much interest in the work, or bear any of the responsibility. It's pretty much that way with all organizations, charitable, religious or what not.

Company-maintained schools and churches are far better than no schools or churches, but they cannot compare in enthusiasm and efficiency to the ones that are organized and maintained by the miners and their families, on their own initiative. In any camp where 90 per cent. of the married men contribute to the school fund, you'll probably find at least 90 per cent. of the children attending school. It is seldom that a man will contribute to a school and then help his boy to play "hookey."

Those of you who live in states where public schools are independent of individual subscription, but require strict truancy laws to maintain their attendance, will be agreeably surprised, if you ever have the opportunity to visit some of these mining-camp schools, in less-favored communities. There are other reasons than the money interest to account for the popularity and success of these mining-community institutions

If a state or county maintains a school, or a company builds a school house for its employees and expects the superintendent to look after it, the men become suspicious of its teachings (thanks to our Socialistic brethren) and resent its influence. Miners as a class are somewhat suspicious and the slightest hint that some one is trying to influence them, for better or for worse, meets with instant rebellion.

Recall the opposition met with by the progressive superintendents who attempted to introduce safety explosives without first obtaining the approval of the miners, and you can realize what some of these same superintendents are now up against, who are endeavoring to persuade employees to send children to school houses built at company expense, under company supervision.

The influence of the schools and churches, organized and maintained by workers, is manifested in many different ways. We once knew of a camp where four miners' families persuaded their men folks against moving to another camp, because they had a $25 interest each, in a church organ. If your boy had solicited subscriptions for a school building and raised $150 don't you think he would offer some objection if you wished to move to another camp?

Moral: Encourage the wives and the children, Mr. Superintendent, to solicit your name last.

Theory Regarding Process of Coal Formation

SYNOPSIS—Anthracite is quite usually regarded as a bituminous coal which has been subjected to great heat but Dr. Bergius tries to prove that it is the result of extreme pressure, that it may be formed from bituminous coal at a far lower temperature and in shorter time than soft coal is developed. His tests also show that in the change a large percentage of methane is formed, whereas, where the coals are bituminous, the principal gas distilled is dioxide of carbon, the free hydrogen in each case being about the same. Thus we are advised against regarding anthracite as the ultimate outcome of all bituminous coals, the differentiation only taking place under extreme compression and moderate heat.

Doctor F. Bergius, of Hannover, Germany, presented at the Convention of Naturalists and Physicians, Vienna, Sept. 22, 1913 (Section of Chemistry and Electro Chemistry), a paper in which he gave an interesting theory of coal formation. The following report is translated from the *Montanistische Rundschau.**

All Coals Are the Results of Completed Reactions and Are Not Transitional

The author, whose papers at former meetings of the Society had already indicated a wholly new theory of the coal-formation process, gave the convention a detailed account of his investigations. They lead to the conclusion that the formation of coal is a thoroughly uniform, comparatively simple, and very characteristic chemical reaction, and that its product, so far as produced from cellulose, is likewise a homogeneous body of permanent chemical composition.

Physical chemistry has reached a point where it is possible to explain this process. This is done by imitating experimentally the extremely slow process of coal formation which has taken place through the geologic ages, carrying it out in a brief time, yet without changing it in essence.

Were Early Failures to Produce Anthracite Due to Excessive Heat?

The earlier experiments were undertaken to attain artificially a product corresponding to coal by dry distillation at a comparatively low temperature. They led to products containing about 82 per cent. carbon and 4 per cent. hydrogen. Natural coals contain considerably more hydrogen; those, however, that have a low hydrogen content, such as anthracite, have a substantially higher carbon content than this artificial product.

According to Bergius, this failure in agreement is attributable to the fact that in the earlier experiments of Klasen and Stein, the exothermic nature of the carbonization process led to overheatings which do not occur in nature. The heat of decomposition of the cellulose is sufficient, under the nonconducting conditions obtaining in the earlier experiments, to produce a temperature of 2300 deg. Fahr. At this temperature the carbonization naturally becomes a coking process.

In order to make the actions solely those of carbonization, it was necessary to remove constantly the excess of heat developed, and this was done by heating in the presence of water, which was well adapted to the purpose by reason of its great heat capacity, conductivity and absorbing power in respect to cellulose. To reduce the process of geologic ages to the compass of a few hours, it was necessary, according to the coefficients of temperature, to heat constantly to about 646 deg. F. The heating must therefore take place under high pressure in a bomb. According to the method here described, systematic experiments starting with pure cellulose were conducted and gave the following results:

The Result Is Different at a Lower Temperature

Pure cellulose was not changed by long heating up to 158 deg. Fahr. By increasing the temperature and time of the reaction, the carbon content gradually increased, the hydrogen content fell, later it occasionally rose, and finally remained constant. In all experiments, however, the carbon content approximated to a constant final value of about 84.8 per cent., and the hydrogen to about 5.8. The rapidity with which these results were attained depended on the temperature.

These values are far closer to the average composition of coal than those of Stein (81.3 per cent. carbon, 3.8 per cent. hydrogen) and Klasen (82.5 per cent. carbon and 4.1 per cent. hydrogen). The attainment of such concordant values under the different conditions of the experiments certainly shows that the same process has taken place.

Of special interest, naturally, is the question of by-products from the reaction. In spite of the difficulties which the method employed opposes to removal of gaseous products, a way was found of determining their composition. There was obtained in all cases a gas of about 78 per cent. CO_2 and 20 per cent. H, which was entirely free of hydrocarbons. Investigation of the reaction quantitatively led with reliable uniformity to the following formula:

$$25\,(C_6\,H_{10}\,O_5) = 6\,(C_{21}\,H_{14}\,O_2) + 24\,CO_2 + 65\,H_2O + 18\,H_2$$

Coal Is a Unit Hydrocarbon Not a Mixture of Unlike Molecules

The result of the so called "incarbonization" (*Inkohlung*)* is not, therefore, as formerly assumed, a conglomerate of amorphous carbon and organic substances but a uniform, stable, chemical compound produced by thermodynamic auto-decomposition of the cellulose.

There arises also a question concerning the production and substance of that coal which contains most carbon, the anthracite. It is generally assumed that we are here dealing with older products of the "incarbonization" reaction in which this reaction has progressed farther.

In the light of Dr. Bergius' observations, this idea is not tenable. Neither by further raising the reaction temperature nor prolonging the time was it possible to de-

*Translated for "Coal Age" by E. P. Buffet.

*The meaning of this word is uncertain, the difficulty being that it has been invented by the author and cannot be determined from its use in contemporary literature. Inkohlung may mean the reactions by which the carbon percentage is increased by driving off hydrogen and oxygen as opposed to reactions of true carbonization in which the body is carbonized from without. Or it may mean that the expulsion of hydrogen and oxygen takes place within an inclosed space and subject to the pressures created by the gases formed by reaction.—Ed.

part from the value for carbon content obtained by thermodynamic auto-decomposition of the cellulose.

Extreme Pressure Produces Anthracite

There was finally found, however, another method of attaining products still richer in carbon—the employment of very high *pressures,* of about 5000 atmospheres. If the products previously obtained were subjected, with a simultaneous moderate increase of temperature, in a suitable experimenting apparatus, to pressures of the magnitude stated, there finally resulted products of about 88 per cent. carbon and 4 per cent. hydrogen, corresponding to natural anthracites.

This process runs its course much more rapidly than the former one, or it can be completed at far lower temperatures if the duration of the action be sufficiently extended. The gas arising from it, which naturally is much more difficult to sample and analyze, possesses a very different composition, that is, about 6 per cent. CO_2, 18 per cent. H_2 and 75 per cent. CH_4.

This result agrees remarkably well with the fact that "lean-coal" mines are those in which firedamp develops abundantly. But also the obvious explanation of anthracite formation from the foregoing experiments, through the effect of high pressure on the "younger" coals, agrees perfectly with geologic experience, according to which lean coals are always produced where heavy rock or folding pressures are exerted.

The course of the coal-formation process according to the experiments of Dr. Bergius was as follows:

EFFECT OF TEMPERATURE, TIME AND PRESSURE ON CARBONIZATION

Temperature (Fahr.)	Time Min.	Per Cent. C	Per Cent. H	
644	18	83.1	5.1	
631	117	84.7	4.8	
644	19.5	84.9	4.8	"Incarbonization"
644	24	84.6	4.8	
644	72	84.8	4.8	
356	64	87.4	4.4	Pressure of 5000
644	20	87.0	3.9	atmospheres

Two Separate Compounds from Cellulose, Which Are Not Transmutable

It is found, therefore, from the observations made, that the formation of mineral coal takes place according to two different processes. One of them, a process of free decomposition, leads from the cellulose to a stable uniform chemical compound C_{21} H_{14} O_2, which is the basis of coals of the fat type, and which may be characterized as "ideal coal."

The other leads from this product, under influence of higher pressures, to coal of the anthracite type. Differences in composition, structure and behavior of the various coals are, generally susceptible of being accounted for by the substances that are decomposed along with the cellulose or are held in it, such as organic (albumen, resin) or inorganic mixtures.

Moreover, since the percentage composition of the "ideal coal" has been determined, it is perhaps possible also to investigate the constitution of actual coal. When this is known, we may be able to utilize coals in other ways than by burning them.

Tennessee's State Coke Plant at Petros

By A. W. Evans*

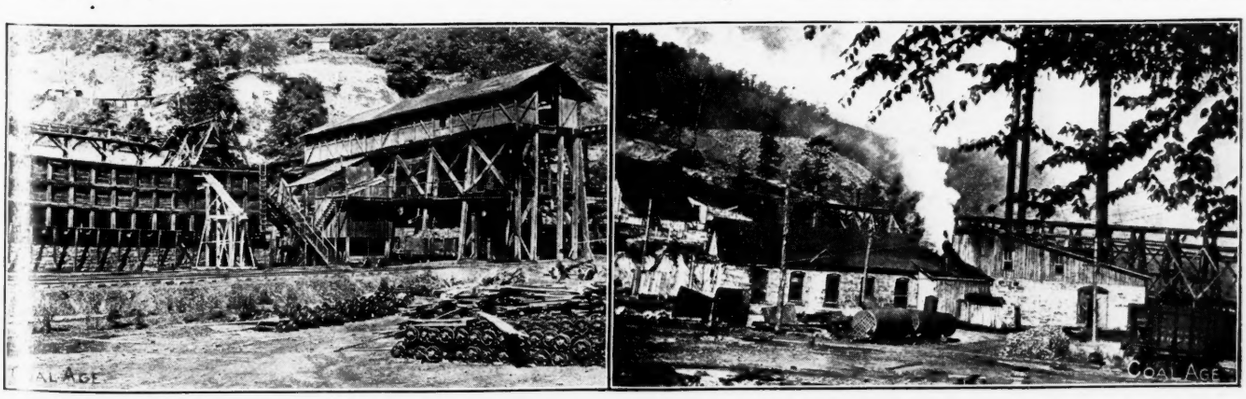
SYNOPSIS—Brief description of coke operation owned by a state government. The plant is located in the Brushy Mountain field. The author gives some valuable cost data both on construction and operation.

The state of Tennessee owns 14,000 acres of coal land in Morgan County, in the geographical center of the Brushy Mountains coalfield. The mountain series in this immediate vicinity are known as the Palmate. Their salient characteristics are long narrow spurs with intervening valleys, ranging approximately north and south. The valleys have fairly moderate gradients presenting favorable conditions for railroad construction.

*Petros, Penn.

Geology

The measures of this vicinity belong to the Carboniferous system. All three of the subdivisions are present. The upper measures are only partially represented, but the middle division is apparently complete, and both of the coal seams in the lower or conglomerate division are also present. The upper measures carry the greatest number of workable coal seams, both in Tennessee and Kentucky. The middle measures are the poorest, but



Tennessee's State Coke Plant. Tipple Bins and Washer on the Left and Power Plant on the Right

have one valuable seam, the Brushy Mountain. The aggregate thickness of the Carboniferous system in this section is approximately 3400 ft., being subdivided as follows: Upper measures, 800 ft.; middle measures, 1400 ft.; the conglomerate measures, 1200 feet.

In a general way the structural geology of Tennessee is comparatively simple. The measures rise steadily from the Kentucky State line as they approach the boundaries between Tennessee, Alabama and Georgia. This field was first opened in 1868, General Wilder, who served as a colonel in the civil war, having heard of the mineral wealth while on a military expedition into the region.

The State Plant

Doctor Safford says of this plant:

The state of Tennessee constructed its mining plant in the Crooked Fork Valley where it is working two seams, the Brushy Mountain at an elevation of 1625 ft. and the Pioneer at an elevation of 2095 ft. In 1896, one hundred coke ovens were constructed on the property at Petros, Tenn. The ovens are of the ordinary beehive type, 12x7 ft., and are built on a 1.5 per cent. grade to expedite the charging which is done by means of rope haulage.

Some years later 40 additional ovens were constructed in a parallel bank. These latter are 12x8 ft., and are what are known as the Rockwood type which embodies something unique in door construction. The brick work of the ordinary beehive oven is supplemented by a matted cast-iron arch, together with seven cut arch stones and two skew backs. There is also a change in the main door casting, the top being made at the proper angle to receive the crown brick.

The eight heavy jambs in the old-type oven are replaced by 20 small ones which conform with the radial lines of the oven, and the thickness of the ringwall brick. The construction of the retaining wall permits the coke puller to get closer to the oven so that shorter tools can be used. The sloping hearth in this type of oven prevents breakage although it makes it hotter for the coke puller.

Detailed Cost of Ovens

I have found that these walls withstand the hard service remarkably well. The following is an estimate of the cost of construction of this type of oven:

Estimate

1 ring or trunnel head	$2.00
1300 r.w. brick at $18	23.40
2850 crown brick at $18	51.30
95 skew backs at 20c.	1.90
124 bottom tile at 8c.	9.92
24 jambs at 8c.	1.92
1 c.i. door frame	7.00
1 matted c.i. arch 1100 lb. at 2½c.	27.50
1 ton of fire clay	3.50
1½ yd. of sand at 60c. (under bottom tile)	0.90
15 ft. 70-lb. rail to carry larry track, 350 lb. at $30 per ton	10.50
14 ft. 70-lb. rail, larry track, 326 lb. at $30 per ton	9.78
14 ft. c.i. water pipe, 434 lb. at 2c.	8.68
14.5 cu.yd. mortar wall at $2.75	39.87
Building oven	19.00
125 cu.yd. excavation at 40c.	50.00
220 cu.yd. of dry wall at $2.75	55.00
Filling around oven	5.00
440 common red brick at $7 (brick for piers)	3.08
6½ bbl. lime at 60c.	3.90
4½ yd. of sand 60c.	2.70
Laying yard tracks at 10c. per ft.	2.80
Laying larry track at 10c. per ft.	1.40
Laying water pipe at 10c. per ft.	2.80
1 coke oven lid, 75 lb. at 2c.	1.50
Valves, hose, etc.	5.00
112 railroad spikes, 5½x⅝-in.	2.00
1 bridle bar for holding track in gage	1.00
28 railroad ties at 45c.	12.60
28 ft. 70-lb. rail for yard tracks, 653 lb. at $30 per ton	19.59
	$385.54

The cost of coke making at this plant will not vary materially from the cost sheet as herewith presented:

Accounts	Free Labor and Materials	Days	Convict Labor Rate	Convict Labor Amount	Total Amount	Cost per Ton
B. & M.	$4,424.14				$4,424.14	$0.[illegible]
C. D. ovens	1,310.53	10,152	$0.4546	$4615.68	5,926.21	0.[illegible]
C. O. repairs	1,110.97				1,110.97	0.[illegible]
C. O. supplies	446.99				446.99	0.[illegible]
Gen. exp.	1,486.17				1,486.17	0.[illegible]
Loading coke	484.75	6,490	0.4546	2905.20	3,389.95	0.[illegible]
Salaries	3,031.63				3,031.63	0.[illegible]
W. coal	1,378.12	3,243		1494.32	2,872.44	0.[illegible]
Coal coked	48,008.86				48,008.86	0.[illegible]
Totals	$61,682.16			$9015.20	$70,697.36	$1.[illegible]

Yearly output (tons)	51,148.25
Shipments (tons)	51,225.50
Average price	$2.5189
Coal coked (tons)	102,578.00

The cost of coal entering into the manufacture of coke, will range from 46 to 60c. per ton.

The coke shipped from the Brushy Mountain Coal Mines finds a market at the Roan Iron Co. furnace at Rockwood, the Dayton Coal & Iron Co. at Dayton, and the Citico Furnace Co. at Chattanooga, Tenn.

The coke has been subjected to chemical analysis with the following result:

Water	0.06
Volatile matter	2.17
Fixed carbon	83.39
Ash	14.38
Sulphur	1.77
Phosphorus	0.008
Real specific gravity	2.00
Apparent specific gravity	1.06
Per cent. coke substance	53.00
Per cent. coke cells	47.00
Shatter test over 2-in. screen	64.40
Shatter test over 2½-in. ring	76.60

The coke made from the Brushy Mountain seam has a bright metallic luster and is quite firm when freshly drawn from the oven; when mixed with a purer coke it makes a first-class furnace fuel.

To determine the best method of treating the coal and to decide as to the proper size to which it should be reduced to obtain the best results in washing, the following float and sink tests were made:

1½-In. to 1-In. Mesh	% of Sample	% of Ash
Float on 1.35	18.51	3.05
1.35—1.55	No sample	No sample
Sink in 1.55	1.88	81.30
	20.39	
1-In. to ¾-In. Mesh		
Float on 1.35	16.63	3.50
1.35—1.55	2.78	19.10
Sink in 1.55	1.21	84.00
	20.62	
¾-In. to ¼-In. Mesh		
Float on 1.35	8.79	4.50
1.35—1.55	1.05	19.52
Sink in 1.55	0.68	69.29
	10.52	

Note—Solutions having specific gravities of 1.35 and 1.55, respectively, were used in making these tests.

The percentage of ash in the total product 1½ in. to 0 in. of coal that floated on a liquid of 1.35 specific gravity would equal 3.64 per cent. and a recovery of 79.97 per cent. The percentage of coal floating on the specific gravity of 1.55 would equal 8.7 per cent. and carry a percentage of ash equal to 20.5 per cent. This quality of coal is termed "bone coal" and shows that in order to maintain a low ash content in the washed product, it must be drawn off with the refuse.

The coal for coking is washed on a Jeffrey-Robinson washer, then carried by elevators to a retention bin of 1000 tons capacity. The washed coal is charged into ovens by two 7-ton larries, connected in tandem. These larries are circular and of the double-discharge type; they run to the oven by gravity, pulling the rope after them and after the oven is charged the clutch on the drum is engaged and the cars drawn back to the bin.

Shaft Sinking under Difficulties

By Charles A. Hirschberg*

SYNOPSIS—In the western part of the Pocahontas field great difficulty is experienced in reaching the coal measures on account of the amount of water encountered. This article describes how some of the principal obstacles were overcome and a good rate of sinking attained.

The undeveloped area of the Pocahontas coal field lies at considerable depth under water level, necessitating deep shafts to reach and develop these rich measures.

Extensive development, in this territory, and likewise the deepest shafts were undertaken by the Carter Coal Co., at Coalwood, W. Va., during the present year. This development and all problems and methods for overcoming the various difficulties encountered were worked out and prepared under the direction of William B. Crawford, consulting engineer for the company.

The main or hoist shaft is 16x30 ft., rectangular, timber-lined, having two hoistways and a compartment for stairway, pipes and wires. The depth when completed will be 650 ft. to the Pocahontas No. 4 seam of coal, and the development is planned for a production of 5000 tons of coal per day. The air shaft is 15x22 ft., rectangular, timber-lined and divided into two compartments, one for air and the other equipped with a geared electric hoist for materials and men.

To hoist the required tonnage from this depth, using single-decked cages, hoisting one 4-ton car per trip, presented an unusually difficult problem. To meet these requirements and conditions, a double conical-drum hoist was designed, coupled directly to a slow-speed, direct-current motor, driven by a motor-generator set having flywheel equalizer and Ward-Leonard control. This hoist will be the largest and most efficient of its type, so far installed in the United States, and is now being built by the Westinghouse Electric & Manufacturing Co., at Pittsburgh, Penn.

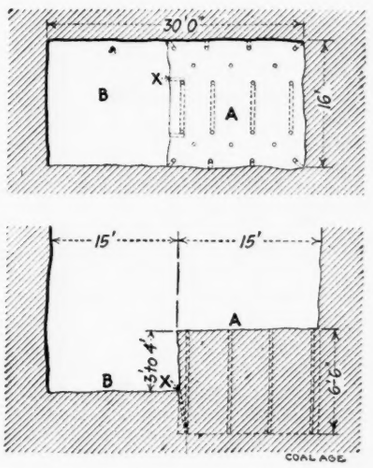
Success of Sinking Thought Doubtful

The success of shaft sinking in this territory has been considered a doubtful proposition, owing to the enormous volume of water to be passed through at various depths, and several companies have abandoned such projects, or carried them through, only at enormous cost. This company while fully realizing the magnitude of the undertaking decided after careful investigation and study that the work could be done in an economical manner, and the various streams of water excluded permanently, as well as during sinking, by forcing cement grout into the fissures and crevices of the water-bearing strata, in advance of the sinking, and thus cementing off the water over a considerable area on all sides of the shafts.

Ransome-Canniff grout mixers are used for this work and the grout placed under about 100-lb. air pressure. The grouting holes are drilled with a Sergeant 3¼-in. rock drill. The results obtained have been highly satisfactory, making the work of sinking reasonably dry. This company also proposes, at its second pair of shafts which are to be started in the near future, to shut off all water by grouting, before actual sinking is begun, thus making the work dry and rendering much greater speed possible when the shaft is sunk.

After the work of sinking had progressed some 200 ft., it was decided that the ordinary type of air drills mounted on shaft bars and tripods, was neither giving the best results nor making the progress desired. The space required to operate these drills interfered seriously with continuous mucking, and the delays necessary in lowering and hoisting equipment, setting columns and mounting drills were considerable, and seriously affected the average sinking speed.

After several experiments, six Jackhamer drills, of the self-rotating type, made by the Ingersoll-Rand Co., were installed and a different method of drilling and shooting was adopted. With these drills and system, each shift is required to drill, shoot and muck out, giving an average gain of 3 to 4 ft. per day in each shaft. This is considered good progress, taking into account the adverse character of the formation, and the delays on account of grouting and water, and has more than doubled the speed of the old system using the other type of drill.



Sinking Method at Coalwood, W. Va.

The two sides of the shaft are alternately driven down.

The method of working and drilling is shown in the accompanying sketch. The shaft is divided into two sections *A* and *B*, each being drilled and shot alternately, so that each section in turn becomes the "bench" and the other the "sump." This method of sinking permits drilling and mucking operations to be carried on simultaneously by restricting the muck to alternate sides of the shaft. This sump is kept clear of water by means of two Cameron sinking pumps.

The Arrangement of Holes

The sketch also shows the position of the various holes. The round averages 24 holes, 6½ ft. deep for each section, 8 being drilled for cut holes and 14 for squaring, while the two marked *X* are drilled last and fired with the squaring holes to act as lifters.

The average drilling time for the round, using the Jackhamers, has been reduced to from 3½ to 4 hours.

*11 Broadway, New York

The steels advance in 1-ft. changes from 2 to 8 ft., with bit sizes as follows:

No. 1—2-ft. steel, 2¼-in. six point, or rose bit.
No. 2—3-ft. steel, 2¼-in. six point, or rose bit.
No. 3—4-ft. steel, 2-in. cross bit.
No. 4—5-ft. steel, 1¾-in. cross bit.
No. 5—6-ft. steel, 1½-in. cross bit.
No. 6—7-ft. steel, 1½-in. cross bit.
No. 7—8-ft. steel, 1¼-in. cross bit.

This gives a gage variation of ⅛ in. and the steel being ⅞ in. hollow hexagonal, provides ample clearance for the cuttings to be expelled.

This is greatly aided by the hole-cleaning device, or throttle placed on the exhaust *A*, see Fig. 2. The operator closes the throttle forcing the air down through the hollow steel to the bottom of the drill hole, and assists the cleaning action and loosens up the cuttings by churning his machine up and down in the hole, the bit being held in place meanwhile by a special device *B*, shown in the accompanying illustration.

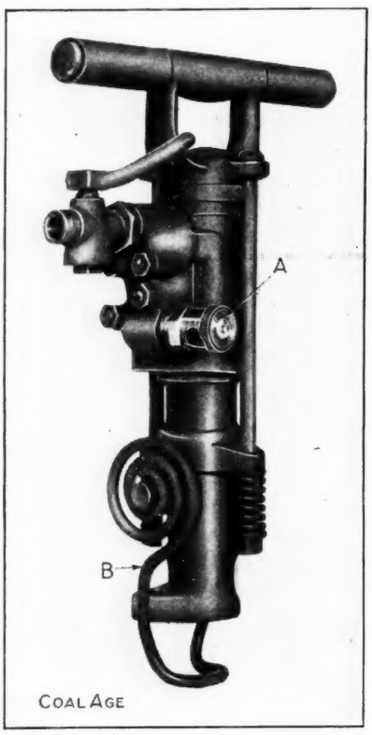


FIG. 2. DRILL FITTED WITH STEEL HOLDER

The sinking equipment, consisting of one "Imperial" duplex and one "Sergeant AA-2" straight-line compressor, hoists, two Cameron pumps, drill sharpeners and shop tools, is all operated electrically, current being supplied by the Appalachian Power Co. from one of its numerous substations. A pressure of 100 lb. is maintained at the drills, and the explosive used is 1-in., 60 per cent. gelatin, fired with electric batteries.

I am indebted to Mr. Crawford, also to J. J. Renehan, superintendent of sinking, and George E. Kerivan, for much of the foregoing information.

Power-Plant Depreciation

Depreciation of power plants is often a puzzling question to the colliery engineer. A recent issue of *Power* offers some good advice on this problem. We quote as follows:

A power plant uses up engines as well as coal and oil. If an engine costs twenty thousand dollars and lasts twenty years, the plant has used up, on an average, one thousand dollars worth of engines a year, and this must be taken into account in making up the cost of power just as certainly as the cost of the coal, labor, repairs, etc., for which money is actually paid out each year.

It is usual to charge the plant with a certain percentage of "depreciation," diminution of value, used-upitiveness each year. A common figure is 5%, which assumes that the plant would need to be entirely renewed in twenty years.

Charles M. Ripley has collected some data bearing upon the life of plants in and about New York. He furnishes a list of plants of which one has been running 30 years; two, 29 years; two, 25 years; two, 23 years; five, 22 years; two, 21 years; one, 20 years; six 19 years, etc. An increasing number can naturally be found for the shorter ages. Most of the plants enumerated were put in by Pattison Brothers, a firm of consulting engineers, with which Mr. Ripley is identified.

The significant point is that these plants, even the oldest of them, are running along nicely, and there seems to be no good reason why any or all of them may not be in active and efficient service after a number of more years of use.

The Everyday Hero

BY BERTON BRALEY

There's a Dago wife in Italy
  Who's dreary an' lone an' sad,
There's a couple of kids in Italy,
  Keep askin' about their dad;
An' the money that Joe Pinazza sent
  It never will come again,
While Joe's insurance is fought in court
  By Yankee insurance men.

It was down in the West Colusa mine
  Which may be known to you,
That John Lubik had gone to his room
  As the pit-boss told him to;
But the damp got thick an' his light went out,
  An' he fell in the darkness there.
An' Joe Pinazza brought him down
  To the drift an' the good, clean air.

"I get him," he said as he laid him down,
  An' that was all he said,
Fer without a gasp he swayed a bit
  An' fell in a huddle, dead;
So we took him up on the rattlin' cage,
  An' we buried him down on the flat,
An' I reckon his soul is up above
  Where the souls of the brave are at.

Now Joe he didn't know Lubik's name
  An' he never had seen his face,
But he saved his life as a matter of course
  An' gave his own in its place.
So Lubik lives and Joe is dead
  —They said that his heart was weak—
But he went the route fer his feller man
  An' he hadn't no yeller streak.

Well, Joe was insured, but it come to light,
  That the company wouldn't pay,
An' Joe's friends sued fer the sake uv the kids
  An' the wife that was far away,
But the company said, in a legal form,
  When the doin's in court began,
That Joe he took a "needless risk,"
  In savin' his feller man.

Now I don't know much about law an' such,
  An' I don't want to know no more,
But I reckon when them insurance men
  Gets up on the judgment floor,
The last great judgment floor I mean,
  That plea of theirs won't stand,
When met by the sobs of some Dago kids
  An' a widow in Dago land.

The Cape Breton, Nova Scotia, Coal Fields

SYNOPSIS—Coal was probably found in Canada several years before it was discovered in the United States and was actually shipped to market over a century before such shipments took place in this country. The fields of Cape Breton were those which were first exploited. The coals have about the same fuel ratio as those of the Fairmont, W. Va., coals. The recent lowering of the coal tariff raises the question whether this Nova Scotia coal may not regain its former place in the New England market.

The fact that the Cape Breton coals were located by the sea accounts for the fact that they were discovered before those of the United States and because they burn easily, they were much sooner brought into practical use than the anthracites which were among the first coals put into use in this country. The first anthracite coal was shipped down the Susquehanna in 1776* and about the same time there was some coal-mining activity in the Clover Hill district of Virginia. The first recorded discovery of coal in the United States dates back to 1679 when Father Hennepin recorded the find in his diary.

Discovery of the Sydney Fields

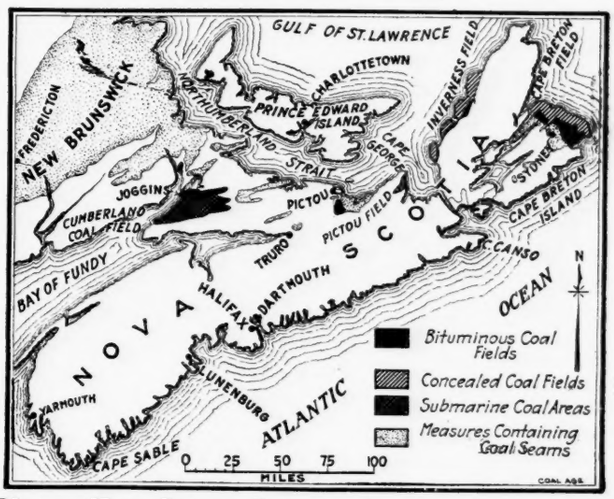
According to Joseph G. S. Hudson in his "Sections of the Sydney Coal Fields, Great Breton": The first printed notice of the existence of coal near Sidney appeared in 1672 when Nicholas Denys published in Paris "A Geographical and Historical Account of the Coasts of North America. Eighteen years earlier, in 1654, Denys had obtained from Louis XIV, a concession granting the right to explore and work mines of gold and other minerals; for this privilege he agreed to pay the King a royalty of one-tenth. In 1677, M. Duchesneau, the Intendant of New France, issued a proclamation, exacting a royalty of 20 sous (20c.) per ton, from all persons taking coal from Cape Breton. In 1711, Admiral Walker, who commanded an expedition to reduce Quebec, mentions in his journal, that he procured a supply of coal from the cliffs, with crowbars.

The initial attempt at systematic mining was made in 1720, when it was found necessary to procure a supply of fuel for the men who came from France to lay the foundations of the fortress of Louisburg. The pit openings then made can be seen even at the present day, at Port Morien, Table head and other places. During the next 100 years, very little work was done, the coal mined being used almost exclusively by the garrison at Halifax.

In 1820, however, when Cape Breton island became part of the province of Nova Scotia, a considerable tonnage of coal was being mined. In 1827 all the mines were transferred to the company known as the General Mining Association by the London firm of goldsmiths (Rundle, Bridge and Rundle) who had secured the mines and minerals concession for the entire island province of Cape Breton, from the Duke of York. The new owners immediately organized, opened out, and systematically operated, mines in Cape Breton, Pictou and Cumberland counties. A formidable agitation had been started in the province for some years previous to 1858, claiming that the monopoly of the coal lands by the General Mining Association was seriously retarding the legitimate expansion of the coal trade; this agitation eventually resulted in the whole subject being referred to the Privy Council of Great Britain for equitable adjustment.

How Nova Scotia Reduced Unreasonable Royalties

In 1858, the Mining Association surrendered its claims to the provincial government of Nova Scotia. The government in return agreed to abolish the fixed rental of 3000 pounds sterling or $14,600 per annum, together with the royalty on slack coal; to reduce the royalty on all screened coal up to 250,000 tons, to 4.80 pence or 9.6c. per ton; and to reduce the royalty on all coal sold over 250,000 tons to 3.20 pence or 6.4c. per ton. To the association, however, was reserved the exclusive right to 20 square miles in Cape Breton, and to 4 square miles each



Map of Nova Scotia, Showing General Location of Coal Fields

Reproduced with some changes from "Coal Resources of the World."

in Pictou, Joggins and Springhill counties respectively. Under this new regime, mining developed to such magnitude that, in 1865, the provincial government appointed an inspector of mines, John Rutherford, M. E., the first on this continent.

In 1854, the Government of the United States removed the duty on coal. This "open-door" policy greatly increased the trade with the New England States; in 1866, the exportation of coal thereto amounted to 404,252 tons. However, in the year of confederation, 1867, the United States once again discriminated against Canadian coal, and imposed a duty of $1.25 per ton. This duty was maintained at this rate until 1872, when it was reduced to 75c. per ton; at which figure it remained until 1894. During this latter period, the exports fluctuated from 228,132 tons, to 13,883 tons.

During the period 1894-97, the tariff was reduced to 40c., but in 1897 it was advanced to 67c., at which figure it remained till this year. Despite tariff barriers, the exportation of Nova Scotia bituminous coal to the New England states continued to increase, and in 1903 the shipments reached a maximum of 968,832 tons. There has been a gradual decrease since that date, and in 1912 the shipments were 412,531 tons. The total production has, however, increased enormously; in 1912 it was 6,-

*William Griffith, "Beginning of Anthracite Coal Trade," "Coal Age," Vol. 2, p. 40.

802,997 tons (of 2240 pounds). Of this production 5,197,601 tons are to be credited to the coal fields of Cape Breton.

A Tariff War Redistributes Markets

This marked increase in the production is due in part to the increased market offered by St. Lawrence ports. In 1877 a select committee of the Dominion Parliament, appointed to inquire into the condition of the coal trade, recommended the imposition of a duty on United States coals; this duty has had the effect of opening up the markets of the St. Lawrence to the Nova Scotia coal trade, and in 1912 the St. Lawrence market alone purchased 2,159,005 tons, most of which came from Cape Breton.

On Feb. 1, 1903, the Dominion Coal Co. was organized with a capital of $18,000,000 by a special act of the legislature of Nova Scotia. This corporation amalgamated the principal interests in the coal areas on the south side of Sydney harbor, Cape Breton. These included the Caledonia, International, Gardner, Old Bridgeport, Glace Bay, Reserve, Gowrie, Victoria and Ontario mines, also the Sword areas, in all comprising 70 square miles; the areas controlled have now been extended to 142 square miles. With the advent of this great industrial organization, a new era in Nova Scotia coal mining began; new mine workings, railway extensions, new shipping and discharging facilities were developed, old coal markets were expanded, and new ones opened out, so that the whole coal trade was revolutionized. In the first year of its operations (1893) the coal mined was 834,019 tons; in 1912, the production amounted to 4,332,320 tons; or an increase of nearly 520 per cent. in 20 years.

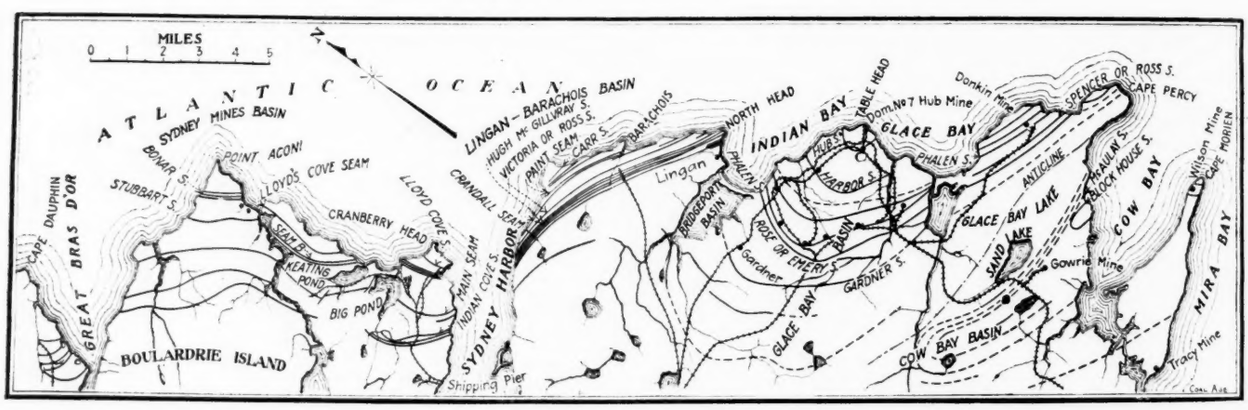
In 1900, the Nova Scotia Steel & Coal Co. acquired all the mining rights still held by the General Mining Association. In addition to operating the existing collieries, they have opened out new mines, erected iron and steel works, and built a modern coke-oven plant, all in close proximity to the working collieries. Their Princess Pit—now known as Sydney No. 1—was, in 1873, the first submarine mine in North America, the coal being won from workings under the sea. The shafts are of unique construction, consisting of metal cribbing or tubbing. The total length of metal tubbing is 842 ft. 9 in. and weighs some 776 tons. Here, also, was erected the first Guibal ventilating fan in Cape Breton.

The most important of the Cape Breton coal fields is that known as the Sydney field. It is an extraordinarily rich tract of coal-bearing rocks, having an area of approximately 250 square miles. It extends along the northern coast of Cape Breton island for a distance of about 35 miles. Geologically the coal-bearing strata are bounded by the outcrops of the Millstone Grit, as seen at Mira Bay, and they terminate at Cape Dauphin, where the intrusive syenites of the Ste. Anne hills form the northern boundary of the Great Bras d'Or lakes. The Sydney field is divided into four main basins, as follows:

(1) *Cow Bay or Morien Basin*, defined on the east by the Millstone Grit and on the west by an anticlinal fault that dips seaward at Cape Percy.

(2) *Glace Bay Basin*, bounded by the Cape Percy anticline on the east, and by the Bridgeport anticline on the west.

(3) *Lingan-Barachois—Victoria Basin.* This basin has not so well defined boundaries as the two preceding basins, but it extends from the Bridgeport anticline, passing the eminence known as David head, to a submerged fault which exists midway in Spanish bay and Sydney harbor.



The Coal Fields Near Sydney, on Cape Breton Island, Nova Scotia, Canada

(4) *Sydney Mines or Bras d'Or Basin.*—This basin extends from the submerged fault in Spanish bay to the western termination of the coal measures at Cape Dauphin.

Seams Are Thick and Numerous

Richard Brown, the well known author of "The Carboniferous System of Cape Breton," states that the thickness of the productive measures of the Sydney field will not exceed 6000 ft. This measurement is taken from Burnt head in the Glace Bay basin, where the highest known bed occurs, down to the Millstone Grit.

The thickness of seams is approximately as follows: Bonar Seam, 6 ft. 10 in., Stubbart, 7 ft. 6 in.; Lloyd's Cove, 8 ft. 1 in.; Seam B, 4 ft. 2 in.; Sydney Main, 3 ft.; Edwards, 5 ft. 5 in.; Paint or Barachois, 12 ft. 1 in. to 13 ft. 4 in.; Crandall, 7 ft. 11 in.; Victoria, Ross or David Head, 6 ft. 7 in. to 8 ft.; Hugh McGillivray, 6 ft. 3 in.; Carr, 6 ft. 6 in.; Lingan Main, 8 ft.; Hub, 9 ft. 5 in. to 9 ft. 10 in.; Harbor, 5 ft. 3 in. to 6 ft. 1 in.; Phalen, 8 ft. 3 in. to 8 ft. 7 in.; Rose or Emery, 1 ft. 8 in. to 5 ft. 6 in.; Gardner, 5 ft. 9 in.; Block House, 4 ft. 2 in.; McAulay, 4 ft. 11 in. and Spencer or Ross 3 ft. 9 in. Of course many of these seams are listed twice under different names. Which of them occur in the same section can be determined by inspection of the map above. Thinner beds exist but are not here recorded.

Discussion of Miners' Compensation Laws

(*Continued from Last Issue*)

SYNOPSIS—Features of the Oregon and Washington laws discussed in relation to the need in Montana, and compared with the experience in Illinois. Relation of compensation to the insurance plan. Disadvantage of the general-fund idea. The compulsory feature of compensation—its need and objections thereto. Efficiency of the Alabama system as practiced by the Tennessee Coal, Iron & R.R. Co. How the law helps the inspector; its effect on small operations. Does compensation reduce the death rate?

MR. MCDERMOTT (*Montana*)—I want to ask a few questions of Mr. Moses regarding some points in connection with compensation laws we, in Montana, are trying to solve. The question of compensation has interested Montana for some few years past; and, at a recent session of the legislature, we had four different measures drafted for submission; but, while there were several points of difference, it was quite evident that they wnated to adopt some form of compensation law that would provide just and equitable compensation for accident.

FEATURES OF THE OREGON AND WASHINGTON LAWS

One of the measures submitted was patterned after the Oregon law; in fact, was a facsimile of the Oregon and Washington law. The idea of the Washington law was to classify the different working classes, according to the hazard of the risk of the industry; and a certain per cent. was collected from the payroll sufficient to meet the accidents incident to the business; and it seemed that was what we wanted. One of the points raised was, whether it would be just to compel companies to pay into an insurance fund, or to adopt some form of compensation law; as they claimed that they were already making satisfactory adjustments and settlements in the cases of persons injured in mines, mills or factories.

Now, to get a little more light on the subject, I want to ask Mr. Moses, first: To whom, in the absence of the state commission, is application for compensation made, and who decides just how much should be paid, under the operation of the Illinois law? Second, what per cent. of the coal mines operating in Illinois elected to come under the compensation law? Third, what objection would there be, from the operator's standpoint, to raising a common fund for compensation? As I understand the Illinois law, each individual company takes care of its own cases.

MR. MOSES—In answer to the first question that Mr. McDermott asked I would say the amount of pay is determined by the number of defendents. I cannot give you the exact rate per child, but it is, for each child, a certain percentage of the earnings of the man while in the employ of the company. If he is a recent employee of the company, then they go to some other company or individual, and ascertain his previous earnings. The application for compensation is made to the company by which he was employed. The law is mandatory that a stipulated sum must be paid for certain injuries, such as the loss of an arm, leg, hand, finger, toes, etc.

In regard to the second question I will say that, based on the number of operators the percentage of those who elected to operate under the law is small, something like 8 or 9 per cent., I believe; but, on a tonnage basis, it is something like 35 per cent. of the entire output of the state.

Replying to the third question, the objection to a common compensation fund is the same that is made to the insurance-company plan. If I contribute one cent and a half per ton or any stipulated amount per ton, I would not make every possible effort to keep my mine in shape, and to keep down accidents; and the same reason applies to the plan of having a common fund. The best idea is to lay the responsibility on individual shoulders and every operator then will do what he can to reduce accident. In other words, operating on a common plan, an honest operator, anxious to reduce accidents and thus lower the rate of compensation, would do everything in his power to make conditions safe in the mines, while the dishonest operator would not do anything; but he would get along just as well as the honest operator, possibly a little better, and the honest operator would be paying for his risk. There is the same objection to the common fund as to insurance companies.

THE COMMON FUND METHOD

MR. MCDERMOTT—In coal mining in Washington 3 per cent. of the payroll was collected for all coal reported throughout the state. This was held as a fund by the state government, and handled and disbursed by commissioners appointed or elected for the purpose. Some in Montana favored the idea of a common fund, and this was thrashed out for ten days, in public hearings, in Helena. All of the large operating companies were willing that some sort of compensation law be enacted that would insure against accidents; but they were unwilling to have laws passed that would do, as Mr. Moses has suggested, and make those companies who were taking every precaution to safeguard their property and the lives of their employees, pay for the other man's accidents. In Illinois, as Mr. Moses has stated, each one pays for their own accidents. There is no common fund or anything of that kind. If Montana had such a law we would have to safeguard our mines better. It seems to me that under the Illinois law a man should show a certain financial responsibility, before he is able to operate. But with a common fund the poor man would be able to operate because he is helped by the extra precautions and safeguards of the larger companies.

There is no difference in opinion among mine workers as to whether a compensation law would be good or absolutely necessary, but what system will give the best satisfaction seems to be the stumbling block. As far as I have heard the argument, I would rather favor a fund, handled by a state commissioner. There are several objections that might be raised against making application to local superintendents for injuries that may or may not be entitled to compensation. For example, if Tom Jones happened to come two or three times a year with little trivial claims for accidents, a superintendent would ignore his claims. On the other hand, I realize that, in a great state like Illinois, with a large number of employees, it would keep three or more commissioners busy,

to investigate every accident that occurred. But I believe we have reached a stage now that compensation is coming whether we want it or not. I believe that West Virginia is modeled more after the German plan. I am greatly in favor of compensation laws.

MR. MOSES—I want to say that the question raised by Mr. McDermott was thoroughly discussed in Illinois, and there is a firm stand by both employer and employee against the general fund idea; and I believe they are right. I am not a convert of the general fund idea, for the reason that, as I said before, it is open to the same objection as the old system of insurance companies. We might just as well leave it in the hands of insurance companies as to establish a general fund. The fund would have one of two things happen to it; it would either be imposed on by the dishonest operator and dishonest employee, to the detriment of the honest operator and honest employee; or the delay in legitimate claims would impose upon the needy. You have created exactly the same feature that characterizes an insurance adjuster who works to adjust every claim for the least possible money that would be accepted. When everybody is responsible for his own protection, he is interested in preventing accidents, which is the real purpose of compensation. We shall find that it is cheaper to prevent accidents than to pay for them; and that should create ideal conditions in coal mines.

MR. ADAMS (*Pennsylvania*)—Did you discuss the idea, in Illinois, of making all companies pay compensation?

MR. MOSES—I feel, personally, that it should be compulsory; but to get the law through at all, we had to submit to the amendment, and make it elective with the companies. We are still fighting for the compulsory compensation law, and hope to win out finally.

THE ASSESSMENT PLAN

MR. FLYNN—I want to say, in conection with these two plans, that probably the plan of Montana would be the better plan for compensation; but the question we are most interested in is: What plan will best serve to reduce accidents in coal mines? I will say that the T. C. I. have tried out several plans. When they first undertook compensation they inaugurated the plan of levying an assessment of so much per ton on the whole output, regardless of any division. After trying that for about two years, it was found that some superintendents were not as active as others in trying to prevent accidents, claiming that the same amount was charged to them, regardless of whether they had any accidents or not, and the mine that had a large number of accidents did not pay any more into the general fund than where they had none.

Then the plan was changed and each division was charged with its own accidents. If one division had no accidents, they didn't pay anything; and if another division had ten accidents, their output was charged accordingly. The superintendents then got busy; because if the accident assessment was four or five cents per ton, at one mine, and only one-half of a cent or one cent per ton at another mine, the management would ask at once, why one division has to pay so much more for accidents than another division, where conditions are practically the same. I want to say that the system worked more successfully than we dared to hope; and all superintendents are now trying to keep the cost of accidents down to a minimum, while under the old system they were not interested. Now, if that applies to a company, how much more would it apply to a state where there are a number of companies. It may be argued that in the mines operated by one company, conditions would be much the same, but they are not; and, since changing the system, we have reduced our accidents to a marvelous extent. I am, therefore, strongly in favor of making each individual company stand for its own accidents.

CLAIMS FOR PRETENDED INJURIES

MR. BOLT—I would like to ask Mr. Moses: To what extent have employees of your company attempted to impose on their employers, under the compensation law, or tried to extend the time of idleness for injuries or attempted to collect compensation for imaginary injuries?

MR. MOSES—I will say that it would be impossible for me to state off-hand the exact number who have tried to lengthen the time of injury by pretending inability to return to work or claimed compensation for injuries not received; but I can state assuredly that out of the 3200 men we have employed, such cases would not exceed ten or thereabout.

MR. FLYNN—How do you decide as to when a man is able to go back to work?

MR. MOSES—We require every injured person to be examined by our physician and if he refuses we pay him nothing; but if the person injured elects to have some other doctor or a number of doctors, he can do so; and we will send him to any hospital he desires, and pay his expenses; but he must submit to examination by our physician, who will say when he is ready to return to work. He must get an order from our physician to the manager of the mines where he was formerly employed, before he can return to work. I will say that we have had more trouble with men wanting to return to work before our physician thought they were able, than with men not wanting to go back to work; and it is more burdensome to the compensation plan for men to go back before they are fully able, than to stay out a few days longer than is actually necessary.

MR. FLYNN—The T. C. I. Company have a similar plan, but if a man elects to have an outside physician, we require that physician to make a report of the accident, and give the man a "return-to-work" slip, which he must have before he is allowed to go back to work. Many insist on going back to work immediately. A broken finger they don't think amounts to anything; but the doctors fear infection and hold them out till that danger is past. A few insist on staying out longer than the doctor requires. Wrenched and strained backs are accidents that will fool the very best doctors. There are more impostures in this class than actual injuries. A fake injury such as a sprained or wrenched back is hard to determine.

MR. MOSES—I will say that our experience is much the same as Mr. Flynn has described. We expect, under the compensation law, to be cheated by some; but we still think it is the best plan of operation.

COMPARATIVE COST UNDER COMPENSATION ACT

MR. FLYNN—Have you any data comparing the cost of accidents prior to the compensation act, and since operating under the act?

MR. MOSES—The only available data previous to operating under the compensation act was the sheet showing the total cost of labor, which included many men of no value whatever around the mines. Owing to the practice of giving easy jobs to a certain number, which had been in operation and was a burden, we had no accurate way by which to obtain figures showing the cost of accidents. It was only possible to compare the total cost of accidents and labor now with the total previous cost of accidents and labor. By this comparison, the total cost appears to have been materially reduced; but it is not entirely on account of compensation; because we have renovated the mines and put them in good shape; and installed new equipment, which would tend to reduce the cost without compensation. The claim I make for compensation is that it has enabled us to accomplish this result better than could be done without the law.

MR. SYLVESTER (*Tennessee*)—I thoroughly agree with Mr. Moses in the conclusion that we must put the liability on the individual employer, in order to cut down the accident list. I would like to ask: To what extent have the small mines, working on a limited capital, adopted this proposition?

MR. MOSES—I don't think that I can answer that question at all, but perhaps Mr. Bolt could answer the question as to the number of operators that have come under the law.

FROM THE INSPECTOR'S STANDPOINT

MR. DUNLOP (*Illinois*)—I would like to say a few words about the Compensation Law, from the inspector's standpoint. I have not regarded this law for the compensation given to the injured employee, or to the family of a man who is killed; but as a means of reducing mine accidents. Few of our operators have elected to work under the compensation act; but the largest operators have done so. Looking more to the prevention of accidents than anything else, the inspectors have met the commissioners frequently, for the purpose of securing what we call "face bosses," for the purpose of supervising the work of the miners and preventing accidents.

One year ago on the first of May, when the Compensation Act first took effect, a coal company that employs something like 1300 men, in two mines, and which, prior to that time had just one face-boss, put on four extra bosses, the very day the act took effect. Some of these men look after the working face only; others see that the men timber their places properly. The records show, however, that they have had more accidents since putting the four men on, than they ever had previous to that time; although it is true that the men were reporting more accidents than they did before.

There is one feature about the Compensation Law, as far as the inspector is concerned; it is better than insurance. Insurance companies, as a rule, simply comply with the statutes and no more; and if an accident occurs, the insurance company makes the settlement. Under the Compensation Act, the operators go further; they do more than the law requires, which is, to me, one of the best features of the law. When the operator is willing to do more than the law requires, it makes it easier for the inspector. The law, in its present form, is hard on small operators, many of whom cannot operate under its provisions. They are required to file a bond, showing that they are responsible and able to take care of any accidents that may occur. That provision will deter many who would be glad to work under the law. * * * * *

I want to say, it was stated that twenty years ago we had good, practical, English-speaking men in the mines; and today 70 per cent. of the miners in Illinois are foreign-speaking men; but with all that, the number of accidents is no greater, but remains the same. The death rate seems to be fixed, as we have not been able to reduce it; but I believe that the Compensation Law is going to be the means of reducing the number of accidents at the face, due to falls of coal and rock. Fifty per cent. of mine accidents occur at the face; and the Workman's Compensation Act is the only thing that will help us. We are not having any more accidents on account of non-English-speaking men in the mines. For every 250,000 tons of coal mined in Illinois, there is a man killed; and that is true of nearly every state.

COMPARATIVE RESULTS

MR. WILLIAMS (*Pennsylvania*)—How do present results compare with those under the supervision given in the face twenty years ago?

MR. DUNLOP—The present law only took effect one year ago; and, as Mr. Moses stated, we are now having reported more accidents than were ever heard of before. I will refer, in reply to your question, to a mine that has been worked with face-bosses, now, for the last six years. The year before the Workman's Compensation Act took effect, the company paid out $1000 for compensation, in one mine alone where 600 men are employed. This last year, under the Compensation Act, when all of the men knew they were entitled to compensation, it cost the company $1800 for accidents. That is the lowest estimate that I have gotten from the district. Another feature is: The injured miner does not know how much he is going to get until he is laid off and the cause of the accident is learned. I will say that the operators are very reasonable and pay what they consider a fair compensation. Viewed from the standpoint of preventing accidents, it is what we want, and I hope it will accomplish that purpose.

EFFECT OF LAW ON FATALITIES

MR. BOLT—In discussing fatalities in Illinois, Mr. Dunlop said the death rate in the last twenty years has remained about the same. I don't know that he is quite correct in that statement, but, if he is, there is something the matter, because anyone who has been in Illinois during the last twenty years knows that conditions have improved wonderfully in the mines, in that time: Ventilation is 100 per cent. better; efficiency in the management has improved by 100 per cent. or more; conditions under which the men are working have improved all around. I hold and have always held that the reason accidents have not been reduced was because of the influx of foreign labor, and I would like to have Mr. Dunlop tell me why, with all of these improvements, the death rate and the rate of accidents have increased, if it is not due to the cause I have stated. With all of the improvements the accidents should not show the same ratio of increase that the tonnage did. I repeat, it is because of the influx of foreign labor in the mines—men who know barely enough to use the pick, and don't know how to protect themselves.

MR. DUNLOP—In looking over the reported fatalities

and investigating accidents, I find that it is not the green men that are being killed. It is the men who have been working in the mines for years. The green man—the foreigner—takes better care of himself than the man of experience. In my opinion the reason for the great number of accidents is careless neglect, growing out of familiarity with the conditions, and taking chances. They gamble on it. It is the experienced men among the non-English-speaking men who are killed.

MR. BACK (*Illinois*)—In the district that I represent (the sixth), the large companies are working, not exactly under the Compensation Law but something similar, while the smaller companies set aside a certain amount as a sort of trust fund, to take care of accidents. The large mines employ face-bosses. In the last year we have only had two nonfatal accidents and but one fatal accident. I have asked what it cost to insure, and the reply was about $44 on each $1000 carried on the payroll. What does it cost under the Compensation Law? The answer is: Less than one-half, after paying all costs of injuries from accident.

I find, also, that when companies are carrying insurance a great many of them do not attempt to keep their mines in good condition; they neglect passageways, driveways, etc. I am heartily in favor of the Compensation Law, and I don't have to ask whether they are working under the law or not; I can see it. Companies working under the Compensation Law are more careful and particular than those where the insurance companies pay the bill. * * * * *

PERTINENT QUESTIONS

MR. PAUL (*Pennsylvania*)—The discussion on this subject has been both interesting and profitable, although some of the discussions have wandered some from the main subject. I would suggest there are a few questions that it would be well to have answered in order to complete the records; so that other members who could not attend the meeting may have the information. I will ask Mr. Moses to kindly answer the questions as I ask them.

Ques.—Under the Compensation Law, of Illinois, have the fatal accidents increased over and above the accidents prior to the operation of the law; or does the increase mentioned apply to mostly nonfatal accidents?

MR. MOSES—I could not answer that question for the entire state of Illinois, because such a small percentage of the operators are acting under that law. I can only answer relative to our own operation, that the fatal accidents have decreased, while the nonfatal accidents have increased.

Ques.—What provision is made for the protection of miners who come under the Compensation Law, at a small operation that may subsequently go into bankruptcy or into the hands of a receiver, or be closed down by reason of a mine fire, if at that time there is standing against the operator a number of claims for the payment of compensation for total or partial disability?

MR. MOSES—It would be the same if that property owed the miner wages; the obligation would rank in the same class as any debt for labor.

Ques.—Do the operators who are now operating under this law carry liability insurance to compensate them in case of accident?

MR. MOSES—Not to my knowledge. I have understood, however, that there were, at the first, some operators who took out a form of insurance against large accidents; but, so far as I have been able to learn, no operator under the law is now carrying insurance.

Ques.—At those mines operating under this law, has there been noted any increase of efficiency on the part of the men, by reason of their being given treatment and being made perfectly well before returning to work; has the production of coal per man increased?

MR. MOSES—Yes, the increase has been about a ton per man per month; but all of that, in my estimation, cannot be attributed to the working of the Compensation Law. Good ventilation and better working conditions and equipment would have some bearing on the increased output per man.

MR. DUNLOP—The new law requires that all operators that elect to come under the law must file a bond.

MR. BEDDOW (*New Mexico*)—My understanding of the Illinois Compensation Law is that it is not compulsory on the coal companies to operate under that law; but part have chosen to so operate and part have not. I would like to know if these companies that are operating under the law, are exempt from personal damage suits, i.e., personal damage suits under the general law, in case of any of their men getting hurt; or are they exempt from such damage suits?

MR. DUNLOP—It does not exempt them from lawsuits: if a miner is not satisfied, he can enter suit, but he then loses his rights of fellow servant plea, etc.

MR. MARTIN—In West Virginia, the law states that when the party injured was injured on account of the operator not complying with the state mining law, that party has the right to apply to the courts.

COMPENSATION IN PENNSYLVANIA

MR. ADAMS—Pennsylvania is now considering the matter; it is before the legislature. We have now something of the form of the Illinois law and some of the good features of other laws, but we want to make that compulsory upon all companies large or small. Such a bill passed the House but when it came to the Senate they started the same discussions as they had in Illinois. It is now in the hands of the conference committee. It is a measure in which the state officials have taken much interest. They want to have a law that will mean something; a law that is possible not only to one party of the coal-mining industry, but equally to both. They want to make it compulsory for all companies to go under this act and not make it elective. I think that ultimately we will get a good compensation law, one possibly superior to those of other states, because we have considered all the other laws. The bill will not come out of that conference committee until it is right and just to all. I am glad that we have, in Pennsylvania, the power to say to legislators that we must have everything just and right. The House has done a grand work and the Senate has made certain changes, but more must be done by the working people. There is a way and a method of arriving at that which will be just to all; the large operator and the small operator alike.

As it stands at the present time, the small operator, if compelled to pay this compensation, would be forced out of the business. That is the worst feature of the measure. An explosion in the mine of a small individual operator would wipe out his life savings in a day.

Program of Coal Mining Institute of America

WINTER MEETING FORT PITT HOTEL, PITTSBURGH, PENN., DEC. 4 AND 5, 1913

First Day

10:30 a.m. ..... Business Session

1:30 p.m. ..... Address
"Efficiency of Bituminous Coal Mining." Harrington Emerson, Consulting Engineer, The Emerson Co., New York City.

2:30 p.m. ..... Question Box
Conducted by John I. Pratt, State Mine Inspector, Pittsburgh, Penn.

3:30 p.m. ..... Paper
"Safeguarding the Use of Electricity in Mines." Clyde G. Brehm, Electrician, Oliver & Snyder Steel Co., Uniontown, Penn.

4:30 p.m. ..... Address
Jesse K. Johnston, Creighton, Penn.—"A Study of the Wages and Selling Prices of Coal in the Pittsburgh District."

6:30 p.m. ..... Institute Banquet
Fort Pitt Hotel
Announced Speakers: Dr. W. J. Holland, Director Carnegie Museum, Pittsburgh; H. M. Wilson, Engr. in Charge, U. S. Bureau of Mines, Pittsburgh, Penn.

Second Day

10:00 a.m. ..... Paper
"The Relative Effect on Men and Small Animals of Small Amounts of Carbon Monoxide." G. A. Burrell, Engr. U. S. Bureau of Mines.

10:45 a.m. ..... Paper
"Basic Coke." J. R. Campbell, Chief Chemist, H. C. Frick Coke Co., Everson, Penn.

11:30 a.m. ..... Paper
"What is a Proper Method of Sampling the Beehive Coke Ovens for Analysis?" F. C. Keighley, Gen. Mgr. Oliver & Snyder Steel Co., Coal Dept., Uniontown, Penn.

1:30 p.m. ..... Paper
"Stray Electrical Currents." W. F. Elwood, Consulting Chemist, Greensburg, Penn.

2:30 p.m. ..... Picture Show
Illustrating Coal Mining Fields and Transportation Problems in Alaska. Dr. W. R. Crane, Dean Mining Dept., Pennsylvania State College.

3:15 p.m. ..... Address
"Portable Electric Mine Lamps." H. H. Clarke, Electrical Engr., U. S. Bureau of Mines.

The Wilkes-Barre District Mining School

This school, conducted jointly by the Wilkes-Barre Y. M. C. A. and the Wilkes-Barre District Mining Institute, is just entering on its fourth year, the first session having been held Tuesday evening, Oct. 14. The sessions will close Apr. 17, 1914. The courses of the school embrace practically every subject in the mining of coal. The work has the indorsement of all the leading mine officials in the vicinity. The course covers two years of practical study in arithmetic, mensuration, geometry, trigonometry, logarithms, mine gases, mine ventilation, mine surveying, mechanics, air compression, electricity and the anthracite mining laws of Pennsylvania.

Charles Enzian, mining engineer of the U. S. Bureau of Mines, is supervising principal. Mr. Enzian was the first instructor in this school, having conducted a class in mining, in the Y. M. C. A., during the winter of 1907-08. The following year the work was carried on under the auspices of the Wilkes-Barre District Mining Institute.

In 1910, it was decided to extend the course of study and a graded school was started, four instructors being employed. The reception accorded the school by all classes of mining men made it a pronounced success, and it was found necessary to start a day class for those men employed on night shifts. This departure required the employment of another instructor, making five in all. Last year, 1912-13, there were 64 students enrolled in the classes; and it is gratifying to report that six members of the school passed the examinations for mine foremen and assistant mine foremen, held in the spring and were awarded certificates of competency.

This year the day class is taught by Richard Lewis, assistant mine foreman, Lehigh & Wilkes-Barre Coal Co. The night classes are taught by W. D. Thomas, mine foreman, Kingston Coal Co., and Robert Johnson, mine foreman, E. C. Lee, mining engineer, and E. B. Wagner, electrical engineer, all of the Lehigh Valley Coal Co. The classes meet every Tuesday and Friday evening, and remain in session from 7:30 to 9:30 o'clock.

The officers and directors of the Wilkes-Barre District Mining Institute are: Thomas H. Williams, president; H. G. Davis, first vice-president; James J. McCarthy, second vice-president; F. M. Devendorf, secretary-treasurer; Thomas R. Evans, A. L. Williams, Charles Enzian, John T. Thomas, Gilbert Jones, P. H. Devers, M. J. Flaherty, Thomas H. Price, Thomas Martin, Thomas J. Williams, Samuel R. Morgans, Gwilliam Edwards, J. S. Hammonds, E. J. Newbaker, Lewis J. Davies and Thomas Thomas, directors.

Alabama & New Orleans Transportation Co.

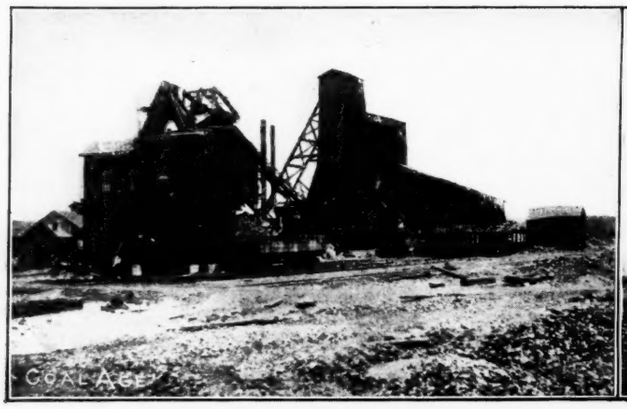
BY B. M. STARNES

That the Alabama & New Orleans Transportation Co. will take a leading part in the coal business in the South, especially along the gulf coast, is very evident. New Orleans uses nearly three million tons of coal yearly, a large portion of which comes 1500 miles from the Pittsburgh district, on account of the low water rates in comparison with the rail rates from Alabama.

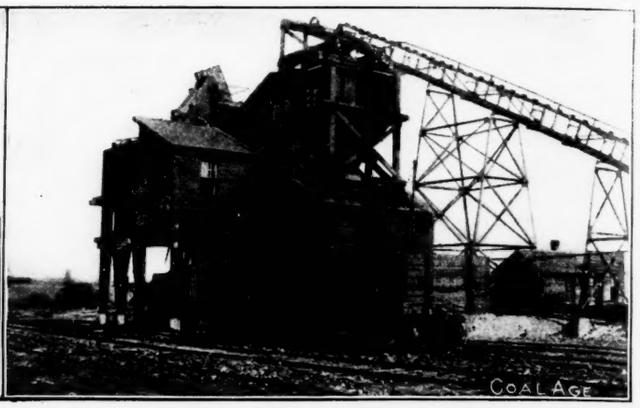
The Alabama & New Orleans Transportation Co. has already completed four barges and is building eleven more, each of 1000 tons (equal to 25,000 bu. as they figure it in Pittsburgh) capacity. The barges, which are an innovation in American watercraft, were designed by General Manager John H. Bernhard on the lines of the boats so successfully used in both Germany and Holland. These barges, constructed in the company's own plant at New Orleans, are self-propelled by producer-gas engines, and the cost of operating amounts to only about $1 per day per barge, exclusive of labor. When completed and put into service, not only will they be able to compete with the Pittsburgh coal, but on account of the much shorter distance, the Alabama coal will be delivered and sold at a lower price than the Pittsburgh product.

The company has bought some three thousand acres of high-grade coal lands on the banks of the Black Warrior River above Tuscaloosa, Ala. Numerous openings are being made and the mines will eventually have an output of more than 2000 tons per day. Even this may have to be increased after a few years. The company has a great advantage in that the coal is weighed, screened, washed and loaded direct from the mine cars into the barges.

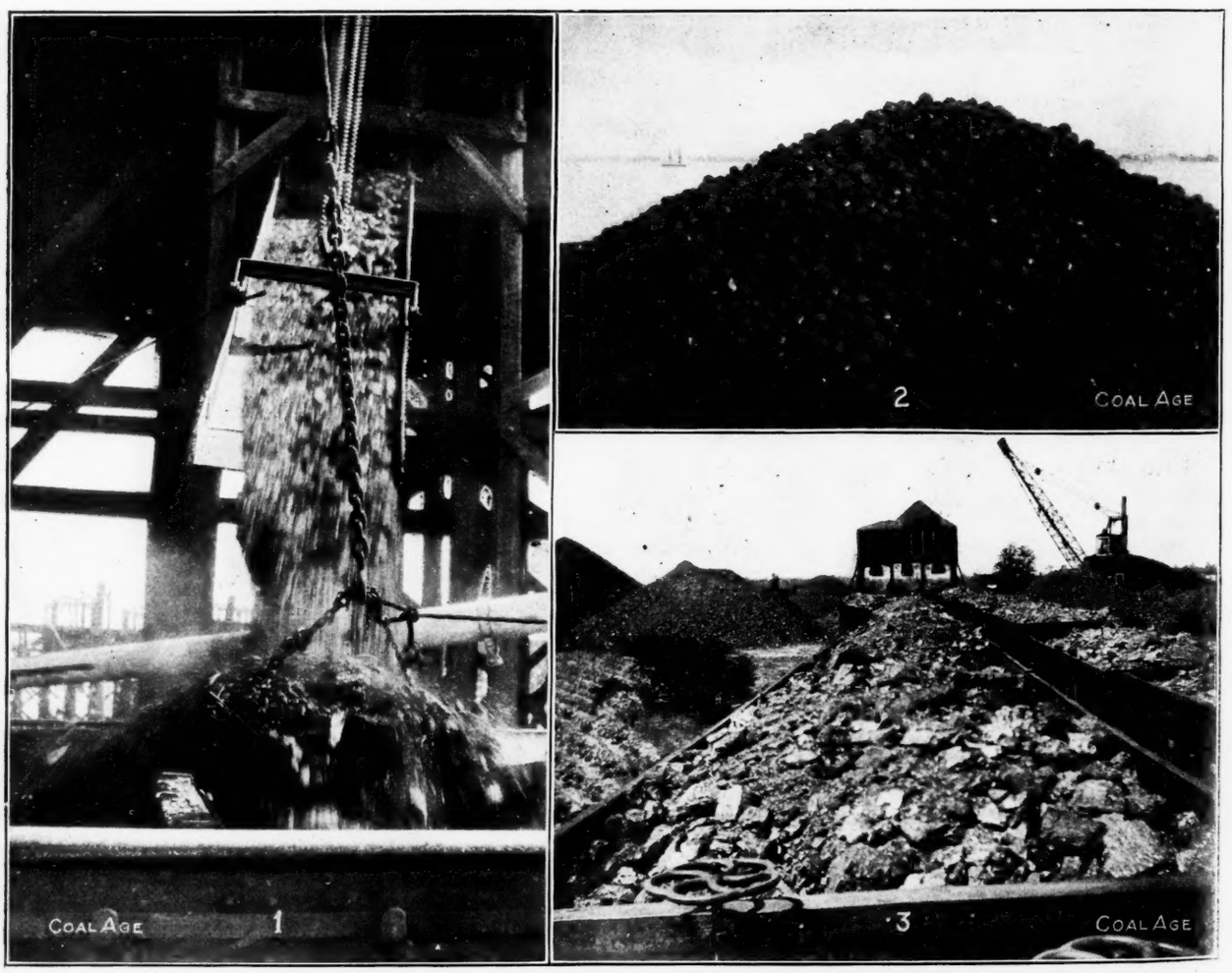
SNAP SHOTS IN COAL MINING



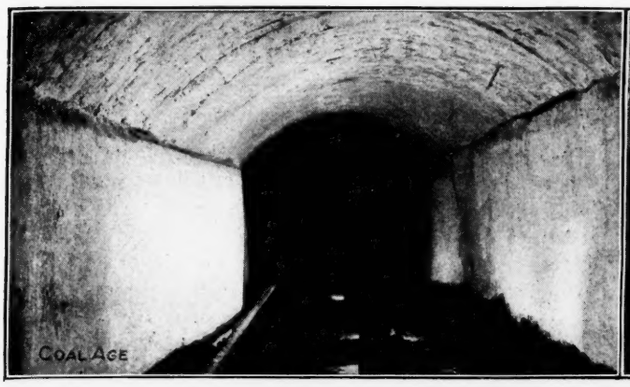
TIPPLE AND WASHERY OF BIG MUDDY FUEL CO., MARION, ILL.



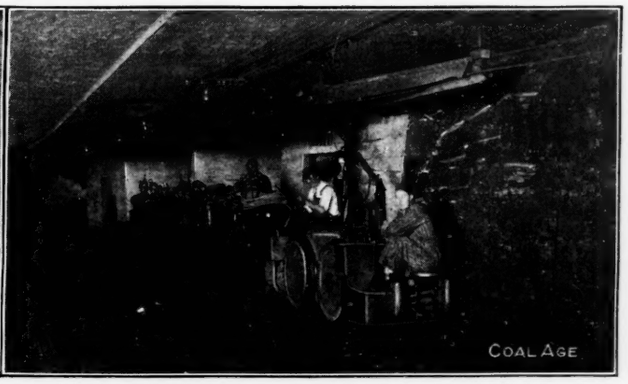
A CLOSER VIEW OF THE BIG MUDDY WASHERY AT MARION, ILL.



1. DUMPING COAL AT THE CHESAPEAKE AND OHIO PIER, NEWPORT NEWS, VA. 2. BRIQUETTES OF POCAHONTAS COAL ON BARGE GOING TO U. S. S. S. "CONNECTICUT." STORAGE PLANT OF THE A. C. LINE. ONE HUNDRED THOUSAND TONS OF KANAWHA AND POCAHONTAS COALS ARE STORED IN THIS YARD

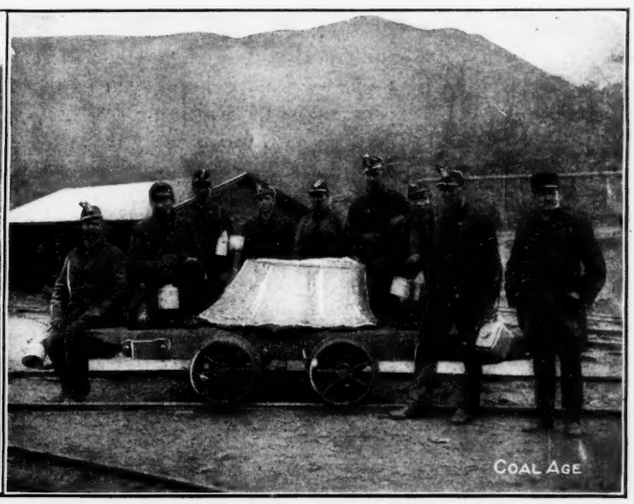


SHOWS STYLE OF CONCRETE ARCH USED NEAR FOOT OF AIR SHAFT IN MINES OF MADISON COAL CORPORATION

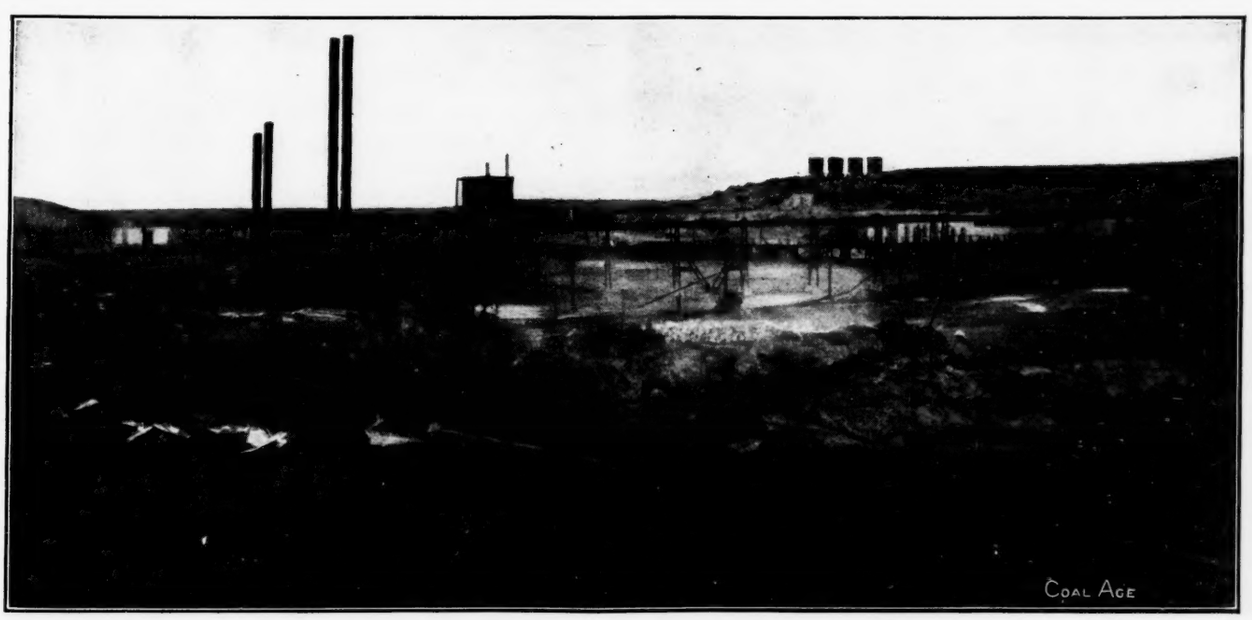


RESCUE TEAM, FIRST-AID CARS AND 50-GAL. EXTINGUISHER, MADISON COAL CORP., MT. OLIVE, ILL.

A GROUP OF BOYS WHOSE JOB IT IS TO PICK SLATE FROM THE ANTHRACITE COAL AS IT TRAVELS THROUGH THE BREAKER



THIS PIECE OF ROCK WAS TAKEN FROM AN ANTHRACITE COAL SEAM.—NOTE REMARKABLE RESEMBLANCE TO A TREE STUMP



THIS VIEW SHOWS PLAINLY THE CHARACTER OF CAMPAIGN NOW BEING CONDUCTED IN MEXICO BY THE SO CALLED REBELS. THE AUJITA TIPPLE AT COAHUILA, MEXICO, WAS COMPLETELY DESTROYED

A Defense of the Flame Safety Mine Lamp

By E. A. Hailwood*

SYNOPSIS—A modern safety lamp passes flame only under several peculiar conditions, which are most unlikely to happen at one and the same time. A current of air is not likely to be at once both strong and gaseous enough to cause a good lamp to pass flame, nor are a dirty or punctured gauze, or a cracked glass so dangerous as is commonly thought. Even the crushing of a safety lamp in a gaseous mixture is little likely to cause an explosion. The safety lamp has probably been blamed for disasters in which it had no part and other causes of accident have been overlooked to the detriment of the one agent which satisfactorily determines the presence of gas and its quantity.

Prior to the days of Sir Humphrey Davy, it was no doubt natural to fix upon the naked flame then in common use as the probable cause of coal-mine explosions.

The Davy Lamp was then invented, and was thought to be a solution of the difficulties, but unfortunately it was afterwards shown that under certain conditions, gas when ignited inside the lamp could be blown through the gauze which surrounded the flame and an explosion created in the mine. The Davy Lamp was, however, remodeled, and the present type of bonneted Marsaut safety lamp was evolved.

False Inference from the Davy Lamp

It is, however, somewhat unfortunate that the tricks which could be played on the old Davy lamp have so fascinated professors and many so called Government experts, that they have not been able to realize that the same tricks cannot be played upon the modern safety lamp. These people still devote considerable time to describing and exhibiting experiments on safety lamps, and fail to draw attention to the fact that their experiments and their writings really refer to the Davy lamp and that such discouraging results are not obtained with its more modern successors.

The natural result is that an unnecessary nervousness is created in the minds of miners and coal operators who have not the time or means at their disposal to learn that these tests do not apply to the modern flame lamp, and while I agree that experiments on the Davy lamp are instructive, I contend that it is unfair to the flame-lamp manufacturers not to place more emphasis on the fact that the demonstrations refer only to obsolete lamps.

Explosions Are Charged Offhand to Safety Lamps

One unfortunate result of these records of experiments is that at the inquiries following an explosion in a mine, many practical men and many so called experts calmly state that in their opinion the explosion was caused by a "safety lamp."

From my experience in connection with a large number of tests on safety lamps, and from a perusal of evidence upon which these statements of experts have been based, I am firmly convinced that the persons giving evidence have known little or nothing about the great margin of safety possessed by modern flame safety lamps, or that the person in question has been misled by published tests on the old Davy lamp.

One of the baneful results of verdicts based on such evidence, is that instead of pursuing the inquiry further as should be done, the inquirers overlook the actual cause of the disaster. Perhaps an unnecessary change is made in lamps, and yet the real means for creating a fresh disaster are still retained in the mine.

Several Unlikely Conditions Must Conspire to Cause an Explosion

A white-hot heat is necessary to cause flame to pass from the inside of a well constructed bonneted lamp to the outside. This temperature can only be attained by subjecting the lamp to an explosive mixture containing 8 to 9 per cent. of methane traveling at over 3500 ft. per min. Persons acquainted with these facts will realize that it is a mistake to talk of creating an explosion in a mine by the over-heating of a well designed lamp. Many an explosion has been wrongly charged to this cause.

The majority of lamps now in use are fitted with bonnets or shields, and I have had lamps of this description in explosive mixtures and the gas inside the gauze burning for hours and the gauze red hot, and yet an outside explosion has not occurred. I submit that it will be an extremely rare occurrence to find the following three concurrent conditions: An explosive mixture of gas traveling in a mine at a velocity of 3500 ft. per min., a lamp placed in such a position as to receive the full force of this velocity, and a miner standing by oblivious of the unusual dangers. Such a combination of circumstances is so remote as to be unlikely to happen and may be dismissed as out of the question.

If the velocity be greater than 3500 ft. per min., but if the enormous requisite volume of gas for the passage of flame be absent, then there is no danger. On the other hand, if gas be present but if the requisite excessive velocity be missing the lamp would be unlikely to cause an explosion. Again, the miner would not be disposed to remain in such gas. The danger from "still" gas is furthermore unlikely to occur, as the illumination given out from a dangerous mixture of gas burning inside a safety lamp would be so small that the miner could not continue working by its light.

Are Explosions Likely from a Dirty Gauze or a Cracked Glass?

In another series of tests, the flame was kept burning in a lamp surrounded by an explosive mixture of gas. At intervals coal dust was scattered inside the lamp and also over the outside of the gauze. The lamp was constantly shaken about in the gas, and finally coal dust was allowed to remain on the crown of the gauze for some hours. The gas flame burned immediately underneath the top of the gauze, and had ample opportunity to heat and coke the coal dust.

The lamp had only a single gauze, and the test was carried out at our Pittsburgh factory with natural gas,

*Manager, Ackroyd & Best, Ltd., Arrott Power Building, Pittsburgh, Penn., and Morley, England.

Note—Paper presented to the American Mining Congress Oct. 22, 1913, at Philadelphia, Penn.

yet despite these unfavorable conditions, the flame did not communicate with the surrounding gas, notwithstanding the fact that the gauze was often red hot. If, therefore, single gauzes will not under such conditions pass flame, it is evident that an explosion is still less likely to occur where the flame is protected by a double gauze.

In other tests, a lighted bonneted lamp was passed so slack that on shaking the lamp, the glass has freely rattled. The glass was split from top to bottom, and a crevice cut right across the top and also at the bottom of the split, the crevice being more than $\frac{1}{32}$ in. wide.

This lamp was placed in a most explosive mixture of compressed gas and kept there for over one half hour with the gas blazing inside the lamp. This failed to cause an outside explosion. In the test, the gas mixture was compressed down to two-thirds its original volume, and the gas therefore was in a most explosive condition.

A Hole in the Top of the Gauze Is Protected by Incombustible Gas

In other tests, a lighted bonneted lamp was passed into an explosive mixture of gas, a hole was pierced in the top of the gauze of not less than ¼ in. diameter, and yet the flame failed to pass through the hole and ignite the surrounding gas. No doubt the reason for this was that the products of combustion from the lamp flame covered the hole in the top of the gauze with a barrier of incombustible gas, through which the flame could not pass to the outside gassy atmosphere.

To users of flame safety lamps, this test will no doubt be interesting as it is the upper part of the gauze which is subject to the most wear and tear, and fortunately the test demonstrated that it is the top part of the gauze which is usually protected by the barrier of incombustible gas.

If the lamp in question be extinguished and the products of combustion escape and if the lamp fill with an explosive mixture of gas, and an internal friction igniter is operated so as to cause a flame to form in the lamp and ignite the gas inside it, then I admit that it is possible that this flame would pass through the hole in the gauze to the outside. But this, of course, only refers to this particular type of lamp, and would not refer to those of the type which must be completely inclosed when being relit.

The Cracking of the Glass by Heat Can Be Avoided and Falls of Rock May Be Harmless

Some authorities have made much ado about the possibilities of the heat from the flame of the miners' lamp cracking the glass. This objection is only a question of a few dollars, as clear glasses can now be supplied for miners' lamps of such quality that they may be heated up to about 340 deg. F. and sprinkled with water from a watering can, and yet fail to crack.

Some people have been afraid that a slab of roof falling on a safety lamp might cause an explosion and ignite the gas; but in all the tests I have so far made, before the lamp was dangerously damaged, the flame was extinguished.

In one series of tests, a lamp was placed upon an iron piston, and the piston moved rapidly upwards into a cylinder containing gas, so that the top of the gauze came into violent contact with the crown of the cylinder and the gauze was crushed down. No outside explosion followed, the light in the lamp apparently being extinguished by the crushing or by the rapid movement of the air. It is unlikely that a lamp would be subjected to so severe a test in the mine as was that just described, for these reasons: If the gas was driven down ahead of the falling rock the rush of air would almost certainly extinguish the lamp before the rock came into contact with it and crushed it. If, however, the rock were to arrive first, the lamp would be crushed and the light snuffed out by the fall before the gas reached it. In any event an immense volume of gas would have to be released, to reach a lamp which was crushed on the floor.

In another test, an unbonneted and lighted lamp was placed in a big jet of explosive gas, and the gauze smashed by a violent blow with a mallet. This also failed to ignite the gas, the blow invariably extinguishing the lamp flame. I, therefore, contend that by using a bonneted lamp of suitable design all fears that physical violence may injure it in such manner as to cause an explosion may be discounted.

While I do not, for one moment, advocate the relaxation of any possible effort to insure the supply and issue to miners of nothing but the best and safest lamp. I am of the opinion that the tests just mentioned have shown that the miners' safety lamp gives a larger margin of protection than is generally supposed.

The Present Test for Gas Is So Simple that Another Test Is Sought

It is somewhat unfortunate that the method of ascertaining gas percentages by the safety lamp is so simple that after only a few minutes' or hours' practice with a simple gas-cap observation machine, practically any mine man can read the percentage of inflammable gas in the atmosphere.

It would, no doubt, appeal more to the present "wise" generation if the lamp could be fitted with a series of levers, switches and indicating dials. The appliance would be even more valuable if when the reading were taken, elaborate reference had to be made to square-, cube-root and other tables to interpret the figures obtained. It would then no doubt, be looked upon as a marvelously clever device, and more attention would be devoted at colleges and mining schools to the elaboration of its mysterious workings.

Now putting sarcasm aside, I would submit that the miners' flame safety lamp is the most simple and most accurate and most reliable device which could possibly be conceived for the practical ascertainment of percentages of gas in the atmosphere of a coal mine.

In recent years the organization of evening mining classes has made great strides in all the coal districts of Great Britain. A very large proportion of both adult and young miners have attended these classes. From conversations I have had with many of the teachers and with men in the mines in various parts of the country, and from observation of the behavior of the mining men who visited the works with which I am connected, I am of the opinion that this course of education will ultimately prove to be one of the biggest factors of safety introduced in recent times into the coal mines.

The Importance of Gas Testing Increases

A few years ago few miners knew how to test for gas and read "gas caps." The consequence was that men have often ignorantly continued working in places so

charged with gas as to be on or near the border line of explosibility. No doubt the miner has done things which he would have avoided had he known the dangerous condition of the atmosphere in which he was working.

It has now been established that a severe explosion can be obtained from quite a small percentage of gas if coal dust be present. The present tendency in coal-mining practice is to employ vast numbers of men in every mine on each shift; the number of deaths from an explosion is therefore more appalling (as witness the recent explosion in South Wales, England, where over 400 men appear to have been killed), to employ more electric machinery, such as coal cutters, locomotives, motors, to push the coal face forward more rapidly and risk falls of large quantities of rock roof with the possible bringing down of gas to be ignited by sparks from the grinding rock.

There are also the possibilities of explosions from pipes, cigarettes and matches, so that it is now more necessary than ever to place in the hands of each miner, the means whereby he may ascertain the state of the atmosphere in which he is working.

The best course to pursue will no doubt be to educate the miners more and more into the best methods of using the flame safety lamp and also as to the best manner in which to test for gas.

Some parties have proposed that a flame safety lamp be placed at the entrance to each working place. This is to be given into the charge of the "gangman." This lamp will generally be neglected, however, and as the principal object of the "gangman" is to get as much coal as possible, he will, no doubt, fail to take a lamp into his working place at sufficiently frequent intervals.

On the other hand, if each worker be provided with a flame safety lamp, the early detection of the presence of gas is better assured. Even with the best of ventilation some parts are likely to be overlooked and an explosion of gas may be extended by coal dust throughout the mine.

The Illumination Afforded by the Safety Lamp

Many writers who discuss unfavorably the light given by a flame safety lamp appear to forget that the coal miner does not go down into the mine for the purpose of reading the daily newspaper, but rather to hew coal from a generally well defined coal face, and that, with constant practice he gets so that he could do the work almost blindfolded.

They also overlook the fact that, generally speaking, several men work so near each other at the face that they get a large general lighting effect from the several lamps.* A miner's light, may on the surface seem to be a miserable one, yet in the darkness of the coal mine this same light is quite sufficient for the work.

Certain parties blame the flame of the safety lamp for certain diseases of the eyes of miners, but it would now appear that there are some mine workers who have had the benefit of the increased light from acetylene lamps, yet they now complain that this increased light hurts their eyes. This would seem to raise the question as to what is the proportion of miners whose eyes are naturally weak. These would suffer pain whether the light were good or bad. The elimination of these cases will possibly show that the remainder will be quite satisfied with the existing miners' flame lamp; if not, the illumination can now quite easily and simply be increased to 1½ candlepower.

*This is not true in the pillar workings of the United States. Most of the English workings are longwall.—Editor.

The Coal Strike in Colorado

Special Correspondence

SYNOPSIS—Conclusions arrived at by the editors of Colorado's leading newspapers, after an extensive and impartial investigation of the labor situation in the coal fields. Four of the six principal demands made by the miners are approved by the press representatives.

On Sept. 23 the coal miners of southern Colorado went on strike. The next few weeks were marked by unusual acts of violence, which caused Governor Ammons to call out the troops. Thursday, Nov. 13, editors representing 25 of the leading papers of Colorado met in Denver for the purpose of learning all the facts possible in connection with the strike. Governor Ammons told why he called out the troops and what he proposes to do through their operations. Fred Cornwall, Thomas Dennison and A. Lamont, three men on strike, were selected by the strike leaders, and told why they struck and what they are demanding. John C. Osgood, president of one of the large companies gave the operators' side of the controversy, and John McLennan, president of District 15, United Mine Workers of America, told why that organization called the strike. The six addresses occupied six hours. Every speaker was given unlimited time and no interruptions allowed. Following the addresses, the editors went into executive session and adopted the following resolutions, with three dissenting votes:

TO THE PEOPLE AND THE PRESS OF COLORADO, TO THE COAL-MINE OWNERS, AND TO THE COAL MINERS OF THIS STATE:

For the past two months a strike has existed in the coal-mining industry of Colorado. As a direct result of this strike human lives have been sacrificed, many thousands of laboring men thrown out of employment, property destroyed, business conditions have become depressed, the price of coal has been advanced, the reputation and credit of the state at home and abroad is being impaired, and the public at large is being made to suffer beyond accurate calculation. The unfortunate conditions are not in harmony with the peace, prosperity and general welfare that is supposed to be guaranteed to all men and to all institutions alike under the constitution of the state and of the United States.

For the purpose, therefore, of trying to arrive at a method of assisting in terminating this industrial conflict between the miners and the mine owners in a manner which will be in accordance with the laws of Colorado enacted to regulate the coal-mining industry, the newspapers of Colorado represented, acting on behalf of the general public, have met in Denver, and after hearing the arguments and statements of representatives of the coal-mine owners, of the coal miners, and of the United Mine Workers of America, and a statement from the governor of this state, and having given extensive consideration to each and every one of these statements, and having weighed their effect fully and carefully, the newspapers represented have agreed upon a general and united policy of action, to be recommended to the press of Colorado, with

reference to the termination of this strike, based upon the authority of the existing state laws.

Before stating our conclusions, we desire first to state the cause of the strike, viz., the demands made by the miners upon the coal-mine owners of Colorado, which are as follows:

The Demands of the Miners

First: We demand recognition of the union.

Second: We demand a 10 per cent. advance in wages on the tonnage rates and the following day-wage scale, which is practically in accord with the Wyoming day-wage scale.

Third: We demand an eight-hour work day for all classes of labor in or around the coal mines and at coke ovens.

Fourth: We demand pay for all narrow work and dead work, which includes brushing, timbering, removing falls, handling impurities, etc.

Fifth: We demand check-weighmen at all mines, to be elected by the miners without any interference by company officials in said election.

Sixth: We demand the right to trade in any store we please and the right to choose our own boarding place and our own doctor.

Seventh: We demand the enforcement of the Colorado mining laws and the abolition of the notorious and criminal guard system which has prevailed in the mining camps of Colorado for many years.

Concerning Recognition of the Union

First demand—Recognition of the union.

With reference to the first demand, we submit the following facts and conclusions:

The question of the official recognition of any labor organization or labor union by any employer or employers of labor is a question not reached or controlled by law, but must be mutually desired by both employer and employee to become a recognized reality. In other words, if employers do not desire to recognize a labor union as an organization in the employment of members of that union, there is no law upon the statute books which can or will compel them to do so.

We have come to the conclusion, therefore, that the first demand made by the miners is not one which can be arbitrated by any body of meditators, for the reason that, as stated above it must be a matter mutually desired and agreed to by employer and employee. However, so long as individual workmen in the employ of coal-mine owners desire to belong to a union, they have a perfect right to do so. This right is guaranteed them by the laws of the state, and, therefore, this first demand for official recognition of the United Mine Workers of America, as such, should not be further pressed by the members of that organization in accepting a declaration on which this strike should now be terminated. However, the right of the miners to belong to a union under the authority of the state of Colorado should be recognized and upheld, and should not be objected to by any employer of labor.

With Reference to a Wage Increase

Second demand—A wage increase of 10 per cent.

Fourth demand—Additional pay for additional and varied work.

In our judgment these two demands should be merged into a single demand, especially as both the second and fourth demands contemplate a higher net income in wages for the miners, and our conclusion is, therefore, that these demands should be consolidated and considered under one general proposition.

With reference to this general wage demand, therefore, our conclusions are as follows:

The amount of money a miner can earn depends on the amount of work he can or is willing to perform. In a published advertisement over the name of the United Mine Workers of America which recently appeared in the Denver newspapers, a statement was made to the effect that all the miners wanted was "a LIVING WAGE and the enforcement of the laws affecting the coal-mining industry."

The question very properly arises, therefore, as to what should be considered a living wage.

The average wage earned by the individual coal miners working in all parts of Colorado, as published in the advertisement of the coal-mine owners, we find to be approximately $3 per day, practically $105 per month, and working eight hours a day or less if they choose. This is said to include the wages earned by good, bad and indifferent miners. The wages of some miners is said to run as low as $2.25 per day while other miners individually earn over $7 per day.

A comparison of the average coal-miner's wages for the entire state, of $4 per day, with the wages earned by other classes of laboring men in Colorado who are equally skilled with a coal miner, shows that if the average wages of all coal miners in Colorado is $105 per month, they are now being paid in our belief what has been referred to as a living wage; in fact, that they are already being paid a wage entirely in keeping with the wages paid for other classes of labor in Colorado.

Present Wages Said to Be Sufficient

Therefore, taking the miners at their published word, we believe that their original demand for a 10 per cent increase over the present Colorado scale, and which was later modified in their advertisements to a demand for living wages, has already been met by the payment of the existing scale of wages for mining coal in this state and which is higher in the net wages earned than in any other state. Therefore, this, the second and fourth demand upon the part of the United Mine Workers of America for living wages is now being given the miners by the coal-mine owners.

Third demand—An eight-hour day for all classes of labor in and around the coal mines and at coke ovens.

This third demand is one which is guaranteed to miners employed in underground mines by the laws of Colorado. If the laws of this state have been disregarded in the employment of labor in the coal-mining industry, it is the duty of the governor to enforce this law, and in this he should be heartily supported.

Therefore, our conclusion with reference to the third demand on the part of the miners employed in underground mines is that it should be guaranteed to them in accordance with the laws of this state.

Fifth demand—Check weighmen at all mines:

This, the fifth demand, is another to which the miners are clearly entitled, and which is guaranteed to them under the law. If this law has not been enforced, or if the miners have not taken advantage of their rights under it, it is the duty of the governor of Colorado to guarantee the enforcement of this law.

Right to Trade Wherever They Please

Sixth demand—The right to trade at any store:

This sixth demand, also, may or may not have been accorded the miners by the mine owners. It is a demand, however, which should be guaranteed to them, for the reason that the laws of Colorado provide that no coercion shall be practiced by any coal-mine owner against any miner in the buying of his household supplies. Therefore, this sixth demand should also be guaranteed to the miners under the provisions of the laws relating thereto.

Seventh demand—General enforcement of Colorado mining laws, abolition of guard system:

This seventh and last demand upon the part of the miners is not open to discussion, so far as that portion of it which relates to a general enforcement of the Colorado mining laws is concerned; for, without question, the miners are entitled to receive the full benefit guaranteed to them under the mining laws of this state.

So far as the employment of police or mine guards is concerned, this practice during periods of peace is maintained solely as a matter of police protection against ordinary disturbances and against possible damages to property in times of petty brawls which are of ordinary occurrence in many mining camps; and so long as these guards or police are maintained upon a company property for the purpose of preserving the peace and to protect that property, there is no good or legal reason for their removal. With the exception of this portion of the last demand of the miners, our conclusion is that the seventh demand, for general enforcement of the mining laws of Colorado, is clearly right, and should also be guaranteed to the miners by the full power of the laws of this state.

Therefore, after mature and careful consideration of all the factors in connection with this strike, we hereby make the following declaration:

That the strike which has prevailed in the coal-mining industry in Colorado should be called off under the following terms and conditions, viz.:

First: That the miners should waive their first demand, which is for a recognition of the union, on the ground that the recognition of any union must necessarily be a matter of mutual agreement and not of coercion, and not being covered by any law; and for the additional reason that the laws of Colorado guarantee to every miner the right to belong individually to any labor organization without prejudice or discrimination on the part of any employer of labor.

Second: That the miners should waive their second and fourth demands for an increase in wages, not only for the reason that the wages now paid to coal miners in this state are larger than in most other states, and are as large as paid in most other lines of industry in Colorado, but also for the reason that the modified demands of the miners, as published in the newspapers, asking for living wages, are in our opinion, already met, being paid by them in cash, twice a month, by the coal-mine owners.

Third: That the miners are entitled to have granted their demands, in accordance with the laws relating thereto, designated as follows:

Third Demand: For an eight-hour work day in all coal mines.

Fifth Demand: For a check weighman in all mines where they ask, to be selected from among the miners by the miners, to be paid by them, and without interference upon the part of the operators.

Sixth Demand: The right to trade at any store.

Seventh Demand: The demand for the enforcement of all laws relating to the coal-mining industry.

Also, that all competent striking miners who have not been guilty of violations of the law while in strike should be taken back by the coal-mine owners without prejudice.

Also, that any coal-mine owner has a legal right to employ any person or persons without interference or threats upon the part of any other person or organizations, as provided by law.

Also, that we declare it to be the duty of the governor of this state to compel the enforcement of the state mining laws, to which we pledge our earnest support ad coöperation: and that, to obtain for the miners every right to which they are entitled under the law, the rigid enforcement of the state laws is alone necessary.

Commend Governor for Sending Troops

We commend Governor Ammons for sending troops into one disturbed district of the state, and express our full confidence in the integrity of his purposes respecting the unfortunate industrial strife that exists there. However, we believe that troops should be adequate in number to become sole protectors of life and property in sections of the state where such strife exists or is threatened, and that the National Guard should be recruited to meet conditions as they may arise. That it is our opinion that until such time as the National Guard may safely be withdrawn from the affected districts and law and order restored that all offenses and violations of law pertaining to the strike should be immediately tried before military courts.

We further request the governor to take such action as will prevent the importation of firearms into this state by any individual or any organization, because we believe that no one has a right to bear arms here except those legally authorized to do so under the laws of the state of Colorado.

Thus it will be seen that we have found in favor of the miners in four of the six general demands they have made and have recognized their right to work as union.

That in declining to side with the miners in the other two demands as stated, we have concluded that the miners are already receiving living wages; and have, at the same time, found for the miners in their first demand, by insisting that one of the conditions under which this strike is to be called off is that all competent miners shall have guaranteed to them under the provisions of the laws of the state the right to belong to any organization without prejudice or discrimination on the part of any employer, which means their right to work as union miners on the open-shop plan.

Therefore, in the interest of the miners, of the coal owners, and of the general public, we hereby declare that this strike should be called off under the conditions stated above, in order to insure the future development of the coal-mining industry of Colorado and the peace and prosperity of its people.

In the carrying out of this policy by the governor of this state, we pledge the support of the editors and papers here represented and ask for the coöperation of all our fellow-editors in Colorado, who could not conveniently come to this conference, in support of such policy.

Also, that a copy of this declaration be furnished to the officials of the United Mine Workers of America, a copy to the coal-mine owners, a copy to the governor of Colorado, and that copies be sent to the press of this state for the purpose of advising the people concerning what we believe to be a just and fair declaration under the terms of which this strike should now be immediately called off and industrial peace restored, and that we pledge ourselves to support this declaration, based on law enforcement, in the editorial columns of our newspapers.

JOHN C. SCHAFFER, H. E. BOWDEN,
FRANK S. HOAG, L. C. PADDOCK,
FRED MARVIN

Coal Operators Accept Editors' Proposition

Denver, Colo., Nov. 14, 1913.

Messrs. John C. Shaffer, Frank S. Hoag, H. E. Bowden, L. C. Paddock, Fred Marvin.

Gentlemen:

The undersigned, coal-mine operators, are in receipt of a copy of the proceedings of the conference of editors held in Denver, Thursday, Nov. 13. In this statement you specify the conditions suggested by the editors under which the coal-miners' strike in Colorado should be terminated. We agree to comply fully and in good faith with the conditions suggested by you in said statement.

When the operators receive the protection from the civil authorities for the men who desire to work and for their properties to which they are entitled; are not interfered with in employing men to take the places of those who are now on strike and who left before the strike was called, and are enabled to operate their mines under normal conditions to normal capacity, on the open-shop principle, which has prevailed in Colorado for more than 30 years, we will put into effect the scale of prices for coal heretofore prevailing.

Sincerely,

COLORADO FUEL & IRON CO.,
J. F. Welborn, President.
ROCKY MOUNTAIN FUEL CO.,
D. W. Brown, Vice-President.
THE VICTOR AMERICAN FUEL CO.,
J. C. Osgood, Chairman
Board of Directors.
OAKDALE COAL CO.,
SOUTH CAÑON COAL CO.,
F. B. Lewis, President.
LEYDEN COAL CO.,
MOFFAT COAL CO.,
F. A. Perry.

Representing operators mining 95 per cent. of the coal produced in Colorado.

Open Letter to Miners and Operators

To the Coal Operators' and Miners' Unions of the United States.

Gentlemen:

As president of the American Mine Safety Association I consider it my duty (as well as a pleasure), to call your attention to this "joint movement" for safer mining in the United States and to invite you to join and support it. This organization is one that should receive the moral and financial support of every miner and operator in the country regardless of any and all other considerations. Associate membership can be secured by any coal company or any organization, local union, or group of mine workers at a cost of $10 per year. Can you afford to fail or refuse to take out such membership? Make your application now to H. M. Wilson, 40th and Butler Sts., Pittsburgh, Penn., who is secretary-treasurer.

Hoping this appeal will not be in vain, I beg to remain,

Yours for safer mining,

JOHN P. REESE,
President, American Mine Safety Association.

Gillespie, Ill., Nov. 17, 1913.

COMING SOCIETY MEETINGS

The Coal Mining Institute of America will hold its winter meeting at the Fort Pitt Hotel, Pittsburgh, Penn., Dec. 4 and 5. C. L. Fay, Wilkes-Barre, Penn., is secretary.

West Virginia Coal Mining Institute will hold its winter meeting at Charleston, W. Va., on Dec. 8, 9 and 10. Neil Robinson, Charleston, W. Va., is president; E. N. Zern, Morgantown, W. Va., is secretary.

An International Exposition on Safety and Sanitation will be held Dec. 11 to 20, at the Grand Central Palace, under the auspices of the American Museum of Safety. D. Tolman, of 29 West 39th St., New York City, is director general of the exposition.

The Rocky Mountain Coal-Mining Institute has decided to postpone indefinitely the November meeting which was booked for Denver. This decision is due to the serious strike situation which now exists in Colorado. F. W. Whiteside, Denver, Colo., is secretary.

Kentucky Mining Institute will hold its mid-winter meeting in the College of Mines building of the State University at Lexington, Monday, Dec. 8, 1913. T. J. Barr, Lexington, Ky., is secretary.

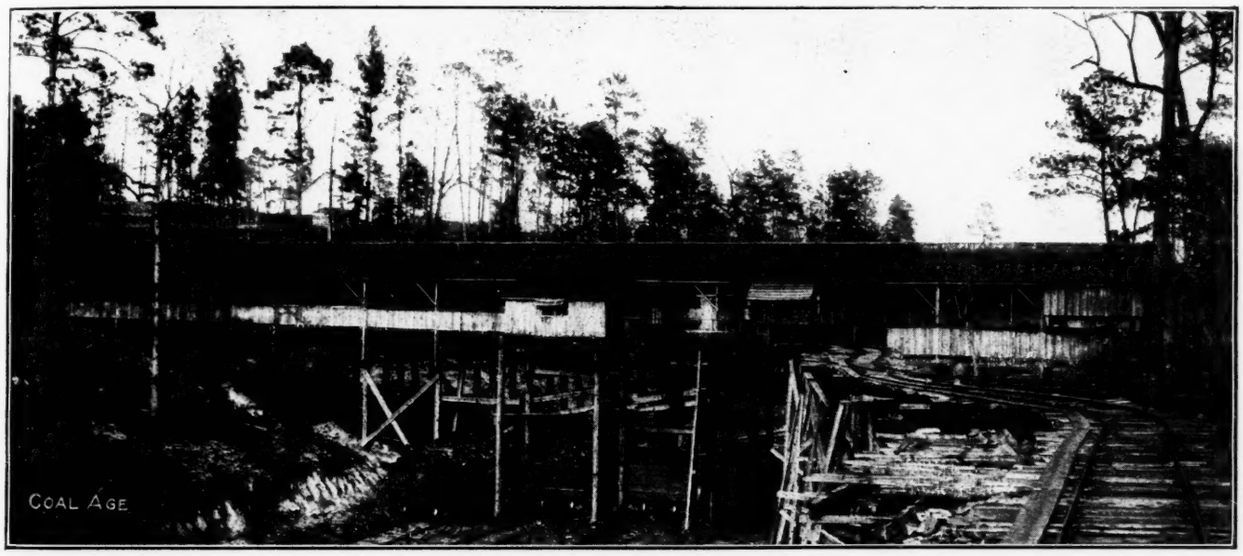
The Second Annual First Aid Contest given under the auspices of the American Mine Safety Association, local union No. 730, U. M. Wof A., and the Superior Coal Co., will be held at the Colonial Theater, Gillespie, Ill., Tuesday, Dec. 9, 1913.

Explosion at Acton No. 2 Mine, Alabama

By a Staff Correspondent

SYNOPSIS—The explosion though severe enough to mutilate frightfully several men, did not even stop the fan, which was allowed to continue circulating the air after the disaster. Fortunately, there was no fire, as a result of the explosion, so the passage of air only assisted the work of rescue which was completed in 12 hr. The mine was not dry and the explosion is to be attributed to the use of black powder in excessively heavy shooting from the solid.

Twenty-four men lost their lives in an explosion which occurred at Acton No. 2 mine, of the Alabama Fuel & Iron Co., on Nov. 18, at about 3:45 p.m. The mine is located in Shelby County, about 24 miles south of Birmingham, Ala. Only 29 men were in the mine at the time of the explosion, and this alone accounts for the low death list. Monday was payday and, following the usual custom in Alabama, most of the men loafed the day following. Of the killed, 13 were Americans; 2, Italians; 1, a Greek and 8 were negroes.



View of Tipple at the Acton No. 2 Mine

The explosion occurred at firing time. Several of the men rescued report that they heard two shots in quick succession and following the second shot, the explosion occurred. The exact point where the explosion originated, or its cause, have not yet been determined, but much evidence points to a windy shot having set off a small pocket of gas or dust in the 8th left heading.

Not a Dry or Gassy Mine, But Coal Was Shot from Solid by Black Powder

The mine has never been considered dangerous, as it generates very little gas and only an average amount of dust; besides this, the mine is naturally damp, drops of water always standing on the roof, near the working face, and some of the haulageways being rather muddy. The danger lay, however, in the manner of shooting the coal, solid shooting with black powder. For this condition, the Alabama Fuel & Iron Co. cannot be censured, as practically all the mines on the same seam are operated under similar conditions. No explosive has been found to give as effective results, from the miner's standpoint, as black powder, and until a state law prohibits solid shooting with this explosive, no single company can take a firm stand. Another dangerous practice, which is also common to most Alabama mines, may have had some effect on the force of the explosion; namely, the presence of nearly full kegs of black powder in several of the entries. As against this, however, little evidence of flame was discovered, and the coked particles usually found sticking to mine props, after explosions, seemed to be absent.

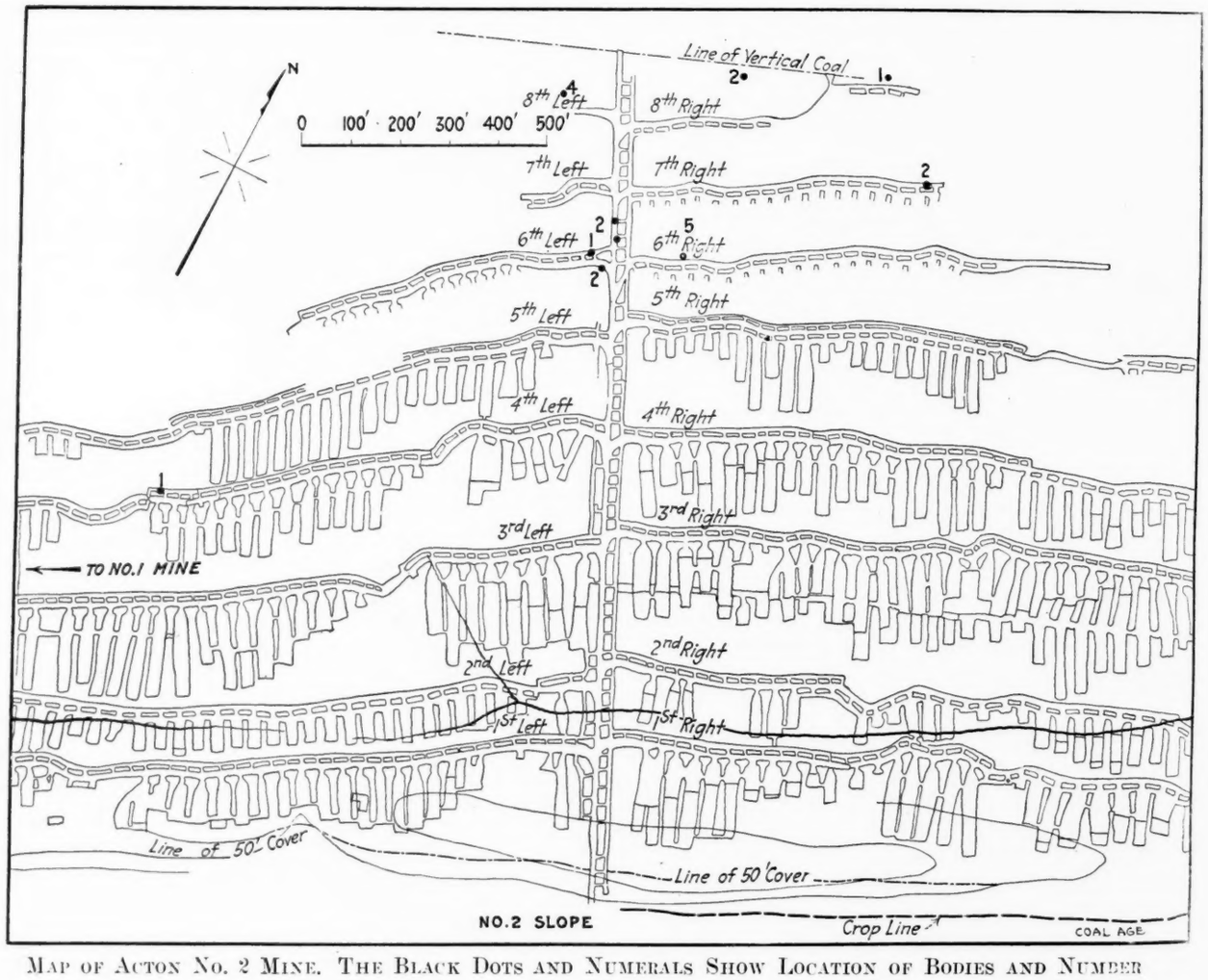
Immediately after the explosion occurred, Chief Mine Inspector Nesbitt was notified by telephone, also the government mine-rescue station and the Tennessee Coal, Iron & R.R. Co.'s rescue crews. E. B. Sutton, in charge of the federal station, was absent, at the time, but H. H. Hamilton, of the DuPont Powder Co. took charge of the government's automobile rescue car and hurried to the scene, piloted by an automobile carrying Chief Mine Inspector C. H. Nesbitt and Charles DeBardeleben, vice-president of the Alabama Fuel & Iron Co. The rescue car of the Tennessee Coal, Iron & R.R. Co., accompanied by 18 trained helmetmen, was started out as a special, by the Louisville & Nashville R.R., at about the same time. The automobile arrived a few minutes ahead of the railroad car and within a few hours of the time of the explosion.

The Fan Was Not Stopped by the Explosion and Was Kept Running

The three helmet crews of the Tennessee Coal, Iron & R.R. Co., composed of five men each, under the direction

of J. W. Groves, instructor, formerly of the Bureau of Mines, and John Meagher, general superintendent of mines, J. R. McCue and Angus Brown, immediately took charge of the exploratory work, inside the mine. This work was less difficult than in any previous explosion in the state, due to the fact that the mine fan was not injured by the explosion and did not even stop running, and very little damage was done to the inside of the mine. Another aiding condition was the air connection through to No. 1 slope, which remained unobstructed. In fact, the explosion was not felt in No. 1 at all.

No men were found alive in the mine, by the helmet crews, four, of the five survivors of the explosion having walked out unaided, before the arrival of the rescue crews, and the fifth man was rescued by a party formed under the leadership of Ed. Husband, of Eureka mine, after the arrival of the helmet crew, but before they had entered the mine. The connection to No. 1 mine through the 4th left of No. 2, made it possible for this crew to explore that heading, and it was in this entry that the fifth survivor was found.



Map of Acton No. 2 Mine. The Black Dots and Numerals Show Location of Bodies and Number of Men Killed

The Rescue Crews Worked Only 12 Hr., and Found All the Bodies

The rescue crews remained on the scene only 12 hr., and in that time penetrated practically the entire mine and found all the bodies. It would be hard to conceive greater possible efficiency than that displayed by the trained men. Crews under the direction of Supt. J. Steele, followed behind the helmet crews and brought t bodies of the victims to the surface and restored the bra tices along the haulageways. E. B. Sutton, in charge the Birmingham federal mine-rescue station, who w deprived of the honor of accompanying his car on its firs trip, arrived a few hours after the car and remained o the scene offering assistance, until the car was no longe needed. Edwin Ball, manager of mines of the Tennesse Coal, Iron & R.R. Co., and Robert Hamilton, chief engineer, also hurried to the scene and proffered aid. C. H. Nesbitt, chief inspector, remained on the scene, directing the work until all the bodies were recovered.

As Usual, More Succumb to Afterdamp Than To Violence

Apparently 15 of the killed owe their death to afte damp; the balance met death instantly and several of t bodies were frightfully maimed. One of the men who su vived the explosion, owes his life to the fact that he l came confused and wandered into an air course, whi his companions attempted to travel the main haulag way and were overcome. Three mules were in the mi at the time of the explosion and two of them were kille

The bodies of the dead miners were found at points indicated on the map: One on 4th left, two on 6th left, four on 8th left, five on 6th right, two on 7th right, one on 8th right, two on 9th right and seven along the main slope and air course. The map was last posted July 1. Since that time, the headings have progressed at the rate of about 100 ft. per month.

A High-Volatile Coal on a Steep Pitch

The coal at Acton is being mined from one of the Cahaba seams, which averages about 4 ft. thick and pitches at an angle of about 20 deg. As indicated by the

Showing Approach to the Acton No. 2 Tipple

map, the mine is worked on the room-and-pillar system, the coal being loaded out of the rooms by means of chutes. The coal is hauled to the surface on a single-track slope. The average analysis of the coal is as follows: Fixed carbon, 58.87%; volatile matter, 34.35; ash, 5.34; moisture, 1.44; sulphur, 0.51.

The mine has a fairly good slate top and is similar in every way to most of the mines in the Cahaba basin. The coal is noncoking and is used largely for domestic and steam purposes. Ordinarily, the mine employs about

Commissary at the Acton No. 2 Mine

men and produces a daily output of 300 tons. In 12, the mine produced 87,859 tons of coal.

All the officials of the Alabama Fuel & Iron Co. extended every courtesy to newspaper men and all others who asked for information. They also exerted every effort to alleviate the sufferings of the widows and orphans. The mine will resume operation, as soon as chief Inspector Nesbitt completes his examination into the cause of the explosion. Most of the brattices and overcasts will have to be rebuilt.

Program of Winter Meeting, Kentucky Mining Institute

Meeting Called to Order at 1:30 P.M., Monday, Dec. 8, 1913.

ADDRESS OF WELCOME:
By Judge Henry S. Barker, President of the State University.

RESPONSE:
By W. L. Moss, President of the Institute.

PAPERS:

"The Clinkering of Mixed Coals Under High Temperatures,"
By R. D. Quickel, Fuel Agent of the Cincinnati Southern Railway.

"Problems Encountered in Mining Coals in the Western Coalfield of Kentucky.
By Newell G. Alford, Assistant Engineer of the St. Bernard Mining Company, Earlington, Ky.

"The Use of Gasoline Motors in Coal Mines,"
By W. C. Whitcomb, General Manager of the Geo. D. Whitcomb Company, Rochelle, Ill.

"The Oil Fields of Northeastern Kentucky,"
By Dr. S. R. Collier, West Liberty, Ky.

"Safeguards in the Use of Electricity in Mines,"
By Prof. W. E. Freeman, State University of Kentucky.

"The Bearing of Coal Mining on Local History,"
By Otto A. Rothert, Louisville, Ky.

ADDRESS:

"The Importance of the Coming Session of the Legislature to the Mining Industry of the State,"
By Senator Joseph F. Bosworth, Middlesboro, Ky.

Coal in the Ancient Lake Beds of Montana

The presence of coal in the tertiary lake beds of verdant valleys in western Montana, has been known locally for many years. Some of these localities have experienced short coal booms, most of which, however, died before the mineral was developed. At the present time, however, systematic mining is being carried on near Missoula.

Coal of the type found in this region has, until recently, been thought worthless, because only such fuel as would coke or stand shipment without slacking was considered of commercial value. In this part of the West where high-grade coal is scarce, where the cost of wood has reached $6 or more per cord, and soft coal imported for domestic use, sells for about $8 per ton, the demand for cheaper fuel is great, and the development of these heretofore unused low-grade coals is becoming profitable.

That these low-grade coals may furnish gas of good quality at a moderate cost, and briquettes suitable for domestic fuel is suggested by the result of experiments with coal of a similar type recently carried on at the University of North Dakota by E. J. Babcock. For this reason an investigation of the resources of parts of Missoula, Ravalli, Granite, Powell, Deer Lodge and Silver Bow counties, in western Montana, has been made by the U. S. Geological Survey in order to obtain data for the classification of the public lands in this area, and to supply the public with information about the coal.

Though a local demand for cheap domestic fuel will cause some further development of these Montana coals, anything like a rapid future for them will depend on an increased use of producer gas for the generation of power, for which these coals seem suited, or the introduction of briquetting machinery which will convert the easily slacked coal into briquettes that may be shipped and stored without deterioration.

EDITORIALS

The Formation of Coal

In another part of this issue we give Doctor Bergius' theory of the formation of coal. He states that anthracite is formed from bituminous coal by extreme pressure accompanied by heat, and that heat without compressive stress cannot convert "soft" into "hard" coal in any period of time, however great. All this he attempts to prove by exposing cellulose to suitable temperatures and pressures.

It is but fair to regard as essentials to the acceptance of his conclusions, certain other positions, some of which he does not take, but which are absolutely to be ascribed to him for they are essential premises to his argument. He may shirk to state them, but if he does not admit that he gives them credence, he vitiates his whole argument and makes his conclusions quite unconvincing.

First, he must either assume that cellulose must be so large a constituent of peat that its reactions are representative of the chemical changes which peat is likely to undergo or else he must affirm that the other bodies in peat despite their dissimilarity of composition must, after certain changes in the earlier stages, eventually pass through the same chemical reactions as if in the first instance they had been cellulose.

We are not disposed to regard cellulose as such a predominant constituent of peat, and we question, moreover, whether that carbohydrate was not already considerably changed by the slow action of ferments before it was materially heated. That this is a fact can be seen by comparing the composition of cellulose with the revised percentage compositions of the following peats from which the ash and nitrogen are supposed to be removed.

Materials	Hydrogen	Carbon	Oxygen
Thèsy peat	6.30	55.45	38.25
Camon peat	6.82	52.41	40.77
Hör in Schonen peat	6.96	55.07	37.97
Cashmere peat	6.31	57.41	36.28
Average of 10 peats	6.57	56.46	36.97
A heavy brown peat (J. Websky)	6.91	63.43	29.66
Cellulose ($C_6H_{10}O_5$)	6.17	44.45	49.38

It will be seen that peat contains a trifle more hydrogen, much more carbon and much less oxygen than cellulose. And in passing let it be remarked that any investigation of the metamorphism of coal is lacking in completeness and therefore in accuracy if it does not consider all the five elements entering into the coal substance, viz: Carbon, hydrogen, oxygen, nitrogen and sulphur. They are evidently not inert to the chemical changes and the last two are not uncombined with the first three and must, therefore, hold some of those elements outside the cellulose bond.

As for the alternative that all is grist coming to the mill of Nature and that resins and humic bodies in the end become like cellulosic bodies under similar treatment, every evidence shows it is not true, and Doctor Bergius has not tried to meet the allegation with refutal by experimenting on other bodies beside cellulose.

The second difficulty is that granting he has produced bodies from cellulose with the same percentage of carbon, hydrogen and oxygen as is found on determining these elements in dry and ash-free coal, then how are we to know that he has not obtained merely an isomer of that fuel and not the coal itself? Nor can we know that this similarity in composition is not the result of the existence in coal of a multiplicity of bodies such as Doctor Bergius tries to deny. Because the product of cellulose is one and indivisible, the learned doctor would have us say, if he has been correctly quoted, that "the formation of coal is a thoroughly uniform, comparatively simple and very characteristic chemical reaction." While this may be true of the cellulosic imitation of coal, yet it is most untrue of that fuel as we find it.

The third difficulty with which Doctor Bergius is beset arises from the fact that his theory rests on the mistaken idea that in bituminous coals there is a certain proportion of hydrogen and carbon and that for anthracite there is another definite relation between these elements. Doctor Bergius claims he has made bituminous coal and anthracite. In the table below we show how uncertain are his evidences. If soft coal contained just 84.8 per cent. of carbon and 4.8 per cent. of hydrogen, and anthracite 87 per cent. of the former and 3.9 to 4.4 per cent. of the latter, we could feel that perhaps Doctor Bergius had lighted on a remarkable coincidence. But his success is not so obvious when the following tables are considered, based on the Bureau of Mines bulletin, entitled "Analyses of Coals in the United States." The figures in this bulletin we have modified so as to exclude sulphur and nitrogen from the analyses and yet bring the total up to one hundred by raising the percentage of carbon, hydrogen and oxygen in due proportion.

Place	State	Fuel Ratio	Hydrogen	Carbon	Oxygen
Lignites					
Tesla	N. D.	0.87	6.21	76.00	17.79
Williston	N. D.	1.06	4.99	73.51	21.50
Sub-bituminous					
Lafayette	Colo.	1.16	5.41	78.05	16.54
Bituminous					
Mineral City	Ohio	1.17	6.19	83.14	10.67
Pittsburg	Okla.	1.32	5.38	85.42	9.20
Blossburg	N. M.	1.60	5.67	86.55	7.78
Bruceton	Penn.	1.61	5.56	87.28	7.16
Dr. Bergius' incarbonized cellulose	....		4.80	84.80	11.40
Semi-bituminous					
Greenwood	Ark.	4.90	4.09	94.60	1.31
Paris	Ark.	5.00	4.42	93.82	1.76
Semi-anthracite					
Bernice	Penn.	9.05	3.83	93.96	2.21
Anthracite					
Scranton	Penn.	10.22	3.23	93.98	2.79
Tower City	Penn.	25.81	3.14	94.41	2.45
Minersville	Penn.	33.13	2.30	95.08	2.62
St. Nicholas	Penn.	76.52	1.80	96.03	2.17
Cranston	R. I.	14.97	0.80	95.92	3.28
Portsmouth	R. I.	28.07	0.38	95.08	4.54
Dr. Bergius' artificial anthracite	....		4.4 to 3.9	87.00	9.1 to 8.7

Perhaps we do not agree with Doctor Bergius as to what constitutes anthracite, and some coals which we term bituminous, he would not so regard. But our greatest difficulty has been to find a fuel having the percentage composition he gives for anthracite or bituminous coal and as will be noted, we have calculated a number of samples in order to test their values with his. Truly Stein's and Klasen's results are wider from the mark than those of Bergius, but we must confess that to our mind even the latter has sent his shaft so wide of the target that his conclusions cannot be accepted.

Those who would sweep away the evidence that coal is a complex body and matures with time must produce better proof than Doctor Bergius has adduced. As opposed to his belief that the carbon, hydrogen and oxygen content of coal is a unit carbohydrate, we have the fact that several solvents will dissolve parts of it and not inconsiderable parts either. Carbohydrates in the original peat mass may become other specific carbohydrates in the coal, but we cannot admit that the coal itself or the peat from which it comes can be cast into a common unit molecular formula. To an analytic chemist, the unity described by Doctor Bergius, as seen through a synthetic window seems to be entirely lacking.

The belief that coal is maturing is favored by the gas found occluded in it. The surrounding conditions under which coal is now found are the same under which to all intents and purposes it has existed thousands of generations, yet it is still full of gas. If the coal has been stable for those centuries, the gas cannot have been formed during that time and would surely by this time have leaked away. The gas which comes from the coal in the Appalachian regions, Doctor Bergius would have us believe, was manufactured some time in the Carboniferous, Cretaceous or Tertiary ages, and has been bottled up since that time, the more recent erosions not being deep enough in places to permit the gas stores to escape. How much easier is it to believe that the gas is more recent and is the result of reactions now taking place, because most of the deposits are comparatively shallow?

Of course, it is conceivable that the writer of the abstract in the *Montanistische Rundschau* may have misrepresented Doctor Bergius and converted an hypothesis into a proof and the closing remarks in the article tend to assist in that conclusion, but, look at the statements as we may, we face always the difficulty that, on Doctor Bergius' finding, not even a surmise along the lines he indicates could permissibly be based.

Mining Classes and Schools

It is gratifying to note the work that is being done in a humble and practical sort of way, in different mining districts, by superintendents and mine foremen who are earnestly endeavoring to improve the conditions and increase the knowledge of the men in their charge. Most of this work is being done without compensation or reward, further than what comes from the increased efficiency of the worker.

Word has just come to us of another effort of this kind, known as the Camp Bulah School of Mines. This school is been taught for 1½ years by Mine Foreman Jonathan Foster, at Camp Bulah, near Midland, Ark. Mr. Foster is a graduate in the coal-mining course of the I. C. S. system. He has had 28 years of practical experience, in the coal field in which he is located; and has served in every capacity from trapper to mine foreman. He knows the field thoroughly and his men.

The Camp Bulah school is located in the heart of the district. The miners have become so interested in the work that they have bought a nice library for the use of the students; and the work of teaching the theory and principles of coal mining is meeting with admirable success. Mr. Foster teaches five nights in the week free of charge.

Another school of which we have been recently advised is that taught by Prof. J. F. Drummond, at Filbert, W. Va. Professor Drummond is employed, for this purpose, by the United States Coal & Coke Co. The school is well attended by the miners, and the results thus far accomplished have been very encouraging. There is no charge made for tuition, and the interest that is taken in the work by all classes of employees in and about the mines is remarkable. It is stated by one of the students that Professor Drummond "is an able instructor."

Supt. W. W. Harding, who is responsible for the establishment and work of the school, is reported to have said that he expects to make this one of the best schools of its kind in the state.

The Underpaid Miner

It appears to be a popular misconception that the coal miner is the most poorly paid and most grievously oppressed mortal existing upon this mundane sphere.

However much of truth there may have been at one time in this hallucination, the fact remains that many a man of only reasonably good physique who can and does work at loading coal in the mines, earns wages which make the "salary" of many a clerk, bookkeeper, minister and other "professional" man appear like the proverbial "thirty cents."

In many regions of West Virginia, for instance, miners who work in what might be termed good average places receive from $5 to $10 per day, and not a few men are highly disgusted when their day's earnings fall below $8. In these mines almost any man who will "pitch in and shovel" can make anywhere from $125 to $200 per month, the amount depending almost entirely upon his own industry.

There are two standards by which compensation for services rendered may be measured. The first of these considers only the man's earning capacity, while the second takes cognizance of his savings. Other things being equal, he who earns $50 per month and is able to save $10 therefrom, is in better shape financially than he who, while earning $150 during the same period, is able to save only a lesser amount.

Compared with the average man who barters his time and his talents for a monthly stipend, the coal miner is as fortunate in the matter of expenses and living conditions as he is in that of his wages. In many, perhaps most mining towns today, the living conditions and expenses compare favorably with the average of those of the big cities. Rents, lights, water and fuel may be had for prices which are merely nominal.

With reasonably good economy and thrift, the miner who is willing to eschew strong drink and work regularly and efficiently, even though he may support a large family, is enabled to lay by for the inevitable rainy day a tidy little sum, ranging from $10 to $50, or even more, each month.

A comparison of the incomes and savings of miners and that of teachers, preachers, clerks, bookkeepers and the like —in fact the majority of that large class of people who consider all manual labor as degrading and look upon the white collar as a mark of distinction and their vested right—cannot fail to reveal the balance in favor of the coal digger.

SOCIOLOGICAL DEPARTMENT

An Important Factor in Modern Industry

By Fred H. Rindge, Jr.*

This is a bit of philosophy which I like to call the theory of the five "C's": "Commerce is dependent upon Capital, Capital is supplemented to a large extent by Credit, Credit in turn is based upon Confidence, and Confidence in the last analysis depends upon Character." There we have the full quintet—Commerce, Capital, Credit, Confidence, Character—and I am writing this article because industry and the Young Men's Christian Association have a common basis in character. One needs and the other produces character. What produces character is bound to promote efficiency, which is one of the leading demands of the age.

What Causes Well Meant Schemes to Fail

With this "economic apologetic" for the work of the Young Mens' Christian Association in industrial fields, it is interesting to note the remark of a prominent manufacturer, who says "The financial interests of my corporation require that I shall do everything possible to improve the workers' character, efficiency and friendliness." Realizing the importance of these things, many employers have wisely decided to put money into welfare work, and the improvement of working, living and recreative conditions surrounding their operatives. Some of these schemes have been very successful, others have failed. If we analyze the failures, however, we will always discover some fundamental reason.

Some companies, for example, have put thousands of dollars into welfare work, apparently without any very lasting result, and have had severe strikes on their hands. Why? Because the employer has probably gone at the work in the wrong way; he has been too paternalistic. Every box of "output" which has gone out of the factory has had a label on it, "We do so and for our men." Workingmen resent this sort of thing. As one workman has well put it—"I would rather have self-respect and some dirt than to be advertised under improved conditions." I heard one labor leader illustrate the point very well, though rather inelegantly, when he said: "The trouble with some of the so called welfare work is that the employer gives his employee no choice in the matter but rolls the whole thing up into the form of a pill and says 'Here, damn you, take it.'"

Betterment Work Should Be Co-operative

Nevertheless, attempts such as the ones described are worthy even though unsuccessful, and have had their place in the present great industrial betterment movement. The truth is, as many experienced employers testify, that to be truly successful, welfare work must be co-operative. The employees themselves must be given a share in it. The Young Men's Christian Association in industrial communities furnishes one admirable basis for welfare work, in which the vital principle of coöperation is given due regard.

Employees pay down their own money for membership privileges, the employer contributes his share, and the men elect their own board of directors. The Y. M. C. A. belongs to the employees as well as to the employer. A carefully trained secretary is provided to supervise and promote the work. The local association derives the great advantages resulting from its relation to the State and International Committees and from the more than 2100 other branches in North America. The association is operated and supported by the employers and employees of the cotton, lumber, coal and other industries, and

An Extension School of the Scranton Y. M. C. A. at Greenwood, Penn.

is also effectively at work on railroads representing 80 per cent. of the railroad mileage of the United States, in the construction camps, and even in those built by the Government Reclamation Service.

The scheme above outlined works. It builds character. It promotes efficiency. It makes right relationships. It yields dividends. One coal operator says: "By actual statistics the output of coal from our mines dropped 10 per cent. every Monday after the dissipation of the men on Saturday and Sunday. Since the putting up of the Y. M. C. A. building, the men have had a decent place in which to spend their leisure time, and the output has been greatly increased." That's the kind of "religion" that appeals to every employer.

What Has Been Done

Regardless of creed or religious affiliation, note the following from prominent employers:

Judge Elbert H. Gary, chairman, Board of Directors, United States Steel Corporation, says: "I am glad to declare my belief in the advantages of having a Young Men's Christian Association in an industrial community as tending greatly to the building up of the character of the men, and, therefore, increasing their efficiency.

Frederick Lewisohn, president, Tennessee Copper Co., states: "I am greatly impressed with the manner in which the Young Men's Christian Association, of Ducktown, Tenn., has

*Secretary, Industrial Department, Y. M. C. A., 124 East 28th St., New York City.

established itself and from what I have observed it is very gratifying to all concerned as it helps very much in banding the employees together in good fellowship."

Dr. J. A. Holmes, director of the Bureau of Mines, says: "I am interested in the Y. M. C. A. work because during the last twenty-five years as I have passed up and down through the great mining camps of Pennsylvania, I have seen the great work which the Y. M. C. A. is doing. I have seen places transformed through its work."

C. A. Cabell, general manager of the Cabin Creek Coal Co. and Carbon Coal Co., writes: "The results obtained by establishing the Young Men's Christian Association at Decota, W. Va., for the benefit of the employees and families in the service of the Cabin Creek Consolidated Coal Co. and Carbon Coal Co., have far exceeded my expectations. It has raised the old men as well as the young from low and injurious amusements to those of a higher and more cultivated character.

"The consumption of spiritous liquors has been reduced more than 50 per cent. So far as I am able to ascertain, gambling among the whites has practically been eliminated. It has raised the standard of good citizenship, the bad element have left because they could not stay and prosper. The

TEACHING ENGLISH TO A CLASS OF FOREIGNERS BY THE ROBERTS METHOD

Sunday school, Bible classes and entertainments wherein the entire family participate have unquestionably created a desire on the part of all for cleanliness. This applies especially to the children.

"If we were starting a new operation today such an institution as is now located at Decota would be one of my first considerations."

PRACTICAL IMPROVEMENTS INTRODUCED BY ASSOCIATION

Such a testimony certainly tells the story, and many others might be given if space permitted. The activities of coal-mining associations are exceedingly practical; therefore, the results are seen in practice. In one mine an explosion of gas seriously burned two men. Two others who attempted rescue were overcome by the afterdamp. A miner trained in the Y. M. C. A. first-aid class crawled into the entry with his face close to the ground and dragged out the four men one by one. He then showed his friends how to administer artificial respiration, dressed the burns and saved the men's lives.

The association has taken an active part in the "safety-first" propaganda. In the National Mine Safety Demonstration in Pittsburgh, sixteen of the forty teams cooperating were organized and prepared for the contest by the mining department of the Pennsylvania State Y. M. C. A. The association also coöperates with the American Red Cross Society and the U. S. Bureau of Mines in the constant extension of first-aid training and English instruction to foreign miners.

Other lines presented which are of great practical value are educational classes of all kinds, Bible classes, illustrated lectures, clean moving-picture entertainments, indoor and outdoor games, campaigns against tuberculosis, flies, mosquitoes, etc., "Clean-up" campaigns, village fairs and picnics, "safe and sane Fourth of July celebrations," boy scouts, promotion of flower gardens and home beautifying even in barren surroundings, thrift and savings features, etc. In all this work the employer usually provides the building and an annual maintenance contribution and the employees voluntarily pay about the same amount in small membership fees. The only place where the scheme has failed is where it has not been tried.

WHAT COLLEGIANS DO FOR ASSOCIATION AND THEIR ADEQUATE RETURNS

One of the most interesting developments of the past five years has been the Industrial Service Movement of the Association, which has enlisted during the past year alone 3500 college students, mostly engineers, in volunteer service for industrial workers. This movement is growing rapidly and already reaches from coast to coast, banding 160 college industrial communities in many kinds of helpful service.

Perhaps the most significant part of this movement is the benefit which these coming engineers themselves derive from the service they render—and as one employer expressed it—"They surely need it." A general manager said to me the other day, "The college graduates in my employ are a confounded nuisance. They come to us with a special knowledge of theory and materials, but when they begin to deal with the men of the shop they make a mess of it. They don't understand the men and don't handle them right."

Thus we are again reminded of the importance of this human factor in industry, and the Industrial Service Movement helps to meet this very need in the life and training of a coming engineer. As these students teach foreigners English, lead educational classes, and do any one of forty different things which bring them into close personal contact with industrial workers they learn to know the men, to understand them, to get a vision of their needs and a sympathy which will make for larger humanity after they graduate from college and get into positions of industrial leadership.

HOW THE COLLEGE GRADUATE WEARS OFF HIS EXCLUSIVENESS

Thus we are constantly receiving letters from many of the 3000 interested engineering graduates which breathe this spirit of larger service. Let me quote from a few:

When I got here in the construction camp, I treated my men with due consideration and was amazed at their response. Other foremen had labor difficulties, but my men went out of their way to say good night and good morning to me and at the close of the job they thanked me for the way I treated them and wanted to work for me always.

As a student I got interested in industrial service and resolved then that any men whom I might later control should get a square deal. I have just investigated the living conditions of my men out here in the lumber camp and found them sleeping on old vermin-producing wooden bunks that had not been changed in six years. I had the whole outfit burned up and an iron cot put in for every man in camp.

Enclosed please find my personal check. I want to put English classes in my steel mill.

We have put in a fine welfare club for our men with reading, writing and smoking rooms. No gambling or liquor allowed. It certainly pays and I am delighted with my share in it.

A few of us have signed up 800 working men for a Y. M. C. A. membership and are anxious to have a building and secretary as soon as possible.

These are perhaps not *big things* but they are significant of the great good that will be accomplished as hundreds of these engineers graduate from college each year with a larger vision and a determination to serve.

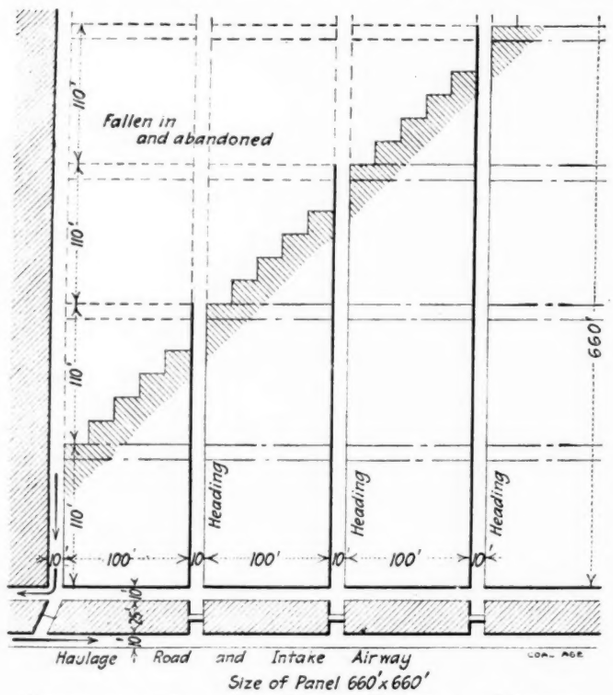
DISCUSSION BY READERS

Working Coal under Sandstone Cover

Letter No. 1—In reply to the request for suggestions, in reference to the best method of working coal under a hard sandstone cover, COAL AGE, Nov. 15, p. 745, I would say that the conditions described in these inquiries are peculiarly difficult to counteract, in the mining of coal.

Unless a suitable method of working is adopted and the mine laid out in accordance thereto, much trouble is liable to be encountered by reason of "squeezes" or "creeps." This is especially liable to occur in the case mentioned, where the cover varies from 400 to 1000 ft. in thickness and the coal is underlaid with a soft stratum of fireclay that has a tendency to heave.

Under these conditions, unless sufficient precautions are taken in the start, there is bound to result a loss of thousands of tons of coal and much timber and iron will be buried beneath heavy falls of roof, and a large expenditure of money will be required for special cribbing.



RETREATING, LONGWALL-PANEL SYSTEM OF MINING

The case presents the combined difficulties of a hard roof that will not break readily and a soft bottom that tends to heave when the weight comes on the pillars. Exposure to air and water always softens a fireclay bottom, which is forced upward by the pressure on the pillars.

In my opinion, the best system to adopt under these conditions is the "block system" of mining, better known, perhaps, as the "panel system." This system is illustrated by the portion of a mine shown in the accompanying figure. Butt headings are driven to the rise of the cross-entries. These headings are driven on 110-ft. centers and made 10 ft. wide, so as to leave pillars 100 ft. wide between the headings. The pillars are crosscut, each 110 ft., the crosscuts being, also, 10 ft. wide. In this manner, the entire panel is divided into square blocks of coal 100x100 ft. The entire mine may be thus divided into panels, say 660 ft. square. Each panel should be worked out separately, and each heading should be driven one block in advance of the succeeding heading.

As shown in the figure, the headings are driven to the limit of the panel, and the blocks of coal worked out successively, on the retreating system. It is important to keep the line of pillar work uniformly straight, so as to avoid any undue pressure being thrown on the pillars. In the figure, the pillars are shown as being worked in steps; but this will depend largely on the nature of the coal, in reference to its cleavage planes. The method has proved successful, under like conditions, many times in the past; and there is no reason but that, with proper precautions, it can be successfully applied under the conditions described.

GEORGE STOCKDALE.

Percy, Penn.

Letter No. 2—I noticed the inquiry, COAL AGE, Nov. 15, p. 745, in regard to the best method of working under a hard sandstone roof when the bottom is soft, in order to secure the largest possible recovery of coal.

For the past 12 years I have been operating under a condition of this kind, and find that the best method of handling the same is to leave pillars of a thickness sufficient to avoid any possibility of squeeze. I have found that the best plan, in the room-and-pillar method, is to take out not more than 30 or 35 per cent. of the coal, in the first working. This leaves from 65 to 70 per cent. of pillar coal to support the roof, and makes it almost impossible for a squeeze to occur.

When this plan is adopted, the coal taken out in the first working is, at least, sufficient to cover the cost of operation; but the greatest profit is realized in drawing back the pillars. The system is somewhat after the longwall-panel system of mining; but differs from that in the fact that when a break occurs, in retreating, and the working face is lost it is more easily regained than in the longwall system. It is important to keep the line of pillar work straight; that is to say, one pillar should not advance more quickly than the other.

Another plan I have found to work very successfully whenever the conditions will permit, is the following: A pair of double entries are driven directly up the pitch, where this does not exceed a 4 or 5 per cent. grade. Rooms are turned to the right and left of these entries, on the strike, of with a slight rising grade of, say 1 or 2 per cent., if desired. The butt entries should be turned from 650 to 700 ft. apart, so as to give ample space for breaking the hard roof. About the same percentage of coal is taken out in the first working as before, and the rooms are driven until they meet those turned off the next

pair of headings. They should meet about midway between the two pairs.

When a sufficient number of rooms have been driven up to insure a good break, the pillars are crosscut at the face, and the work of retreating is begun. As before, it is necessary to keep the line of pillar work straight, so that no pillar will project under the roof and retard the break. I have found this method even more successful than the one first described, in respect to economy of working and ventilation. It provides two good airways for the intake and return currents; and, as the rooms "hole" through into each other, the course of the air is shortened.

MINE FOREMAN.

Education and Training of Mining Men

Mining men who have the interest and safety of their men at heart, and who value their safety above a few tons of coal, are earnestly seeking for means and methods of operating coal mines that will produce the greatest degree of safety, and render the mines more immune from accidents. These mine officials have their eyes open to the fact that safe and sanitary conditions in mining, are paying investments. The growing demand for safer methods in mining, coming as it does from men of experience and intelligence, enlists the best talent and efforts of men to produce the measures demanded. Brains and practical experience working in harmony, will finally solve the problems and produce the safer measures required. Development in the mining industry has progressed rapidly, until the problems and conditions that confront the operator, today, are of greater magnitude than those of any period in the history of mining, and require more thought and greater effort for their solution. In proportion as safe and practical conditions in mining are demanded by mine officials, to that extent will they be produced and maintained in daily practice.

In an editorial, COAL AGE, Oct. 18, p. 585, this statement is made: *"Today, the recognized cornerstone of all effort for improving conditions in coal mining is the practical training and education of mining men."* A greater truth relative to the problem of improving mining conditions was never uttered. In that direction, the active student will find the key that will unlock for him the door to many mining problems; and, as a result, the more practical methods for safe mining will be better known and more extensively used.

Mining knowledge has made rapid advancement in recent years. Improvements in mining machinery and many plans and methods for the prevention of accidents in coal mines have been developed. But all knowledge of mining has not yet been achieved, nor all possible improvements accomplished, or safety methods and measures in mining perfected. Not far back in the history of mining, little was known of many factors and conditions confronting the operator that are now better known and understood.

Formerly all explosions occurring in coal mines were attributed to gas, as this element was known to be explosive. But explosions would occur at times and under conditions precluding the theory of gas explosions. Common sense dictated that the cause must be assigned to something else. What could it be? Research soon revealed the startling fact that dust was a very dangerous factor in coal mines, and would produce a disastrous explosion, under favorable conditions. Is research and investigation to stop here? Are gas and dust the only elements that will produce explosions in coal mines? Are there other causes and conditions in mines that will produce disastrous results, at times? We must not sit down satisfied with achievements already attained, but must earnestly and persistently endeavor to ascertain whether agitated and disturbed atmospheric conditions in coal mines, will produce violent results, in the absence of both gas and dust.

The question of safety in mining when solved or better understood, will not consist in some new and wonderful discovery yet to be made, as some mining men seem to think, but will be attained mainly by a better use of the knowledge we have already acquired, and by the strict observance of means and methods already known. If we will judiciously use the knowledge we have acquired as the result of experience, education and training, we will have gone far toward the solution of many problems of danger in mining and will discover measures of greater safety.

It is said that "eternal vigilance" is the price of safety in any occupation; but it is certainly true in coal mining. The superintendent, who is aware of his limitations, and realizes how little he realy knows of things that affect the safety of mining and help to make the mine immune from accidents, is a safe official, and one who is generally on his guard against disaster. Too great confidence in means and methods pursued, or an overestimation of the safety plans adopted relaxes the attention and may frquently be the cause of mine disasters that, with greater care and vigilance, could have been prevented. The more practical mining men continue to weigh and consider the unsettled question of means and methods for reducing mine accidents to the lowest possible degree, the more prudence and discretion they will possess; and as these essentials in mining increase, presumption will decrease and order and system prevail.

Others cannot know things for us as well as we can know them for ourselves. Miners who think and know for themselves, are better enabled to enlarge their circle of knowledge by the experiences and researches of others whose opportunities for acquiring knowledge have been greater than their own. In proportion as miners know and understand the causes producing dangerous conditions in mining, and the means of neutralizing and arresting these dangerous conditions as they arise, the more interest will they take in the farther research of these things, and the more value will they place on the knowledge attained.

To the degree that miners value their lives and the lives of others about them, to that extent will accidents in coal mining grow less. The miner who places a high value on life, takes few risks and is the safe miner. The uneducated and reckless miner is the greatest source of danger in mines. The education and training of miners will result in many improvements in mining conditions, and prove to be the cornerstone on which systems of safety in mining will be erected, and great mine disasters will then become matters of history.

JOHN ROSE.
District Mine Inspector.

Dayton, Tenn.

To Prevent Gas and Dust Explosions

I was interested in the excellent article of A. G. Hahn, COAL AGE, Nov. 8, p. 709, relating to the prevention of gas and dust explosions. It reminded me of a little incident that occurred where I worked some years ago and which shows the careless manner in which places generating gas are often safeguarded.

The fireboss who examined the place and found a dangerous quantity of gas, simply put an empty powder keg in the road and placed a small piece of dirty wooden rail on top of it, with a rather doubtful mark "gas." This was the only caution placed there to prevent anyone from going unwarned into the gas. The ventilation throughout the mine was poor, the fan being taxed to the limit of its power. This condition, later, caused an explosion, which would not have occurred had the company provided sufficient power to properly ventilate the mine.

My plan is always to have a good current of air passing, especially in the winter season. The quantity of air circulated in a mine should fulfill the requirements of the mining law. The thermometer is an important factor in determining the quantity of air. Regard should always be had to the temperature, in order to properly regulate the air current, in a dry and dusty mine. When the zero point is reached in the outside atmosphere, the air current in the mine always has more drying power; and it is necessary, at such times, to use greater precaution.

It is also important to observe carefully the reading of the barometer and to observe whether the atmospheric pressure is increasing or decreasing. A falling barometer presents a condition that is generally accompanied by a greater inflow of gas into the workings than when the barometer is rising; and at such times greater precaution is necessary in regard to the use of safety lamps.

Besides these conditions, there are some practical points that should be carefully borne in mind. When driving headings in solid coal (virgin territory), as when developing a new area, it is important to keep a careful watch for gas. The same or even greater caution should be used in rooms opened off such headings. Faults of any kind, either in the top or bottom of the seam, such as "slips," "spars," "clay veins," etc., generally yield a fresh supply of gas. A good current of air should be maintained, in driving all such places.

In working a very gaseous seam, it is often a safe precaution to keep a drill hole in advance of the heading, so as to drain the gas from the face of the coal as much as possible. A good water system should be maintained at the working face, in all gaseous mines.

ROBERT W. LIGHTBURN.

Adelaide, Penn.

Study Course in Coal Mining

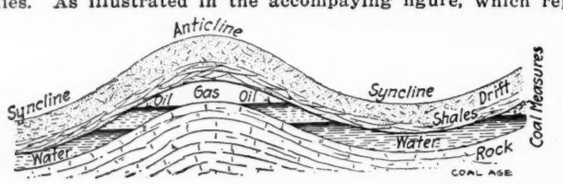
BY J. T. BEARD

The Coal Age Pocket Book

Natural or Feeder Gas—All gas formed and contained in the strata is called "natural gas," in distinction from gas manufactured in the industries. Natural gas commonly occurs in large volume, in coal formations, where it accumulates in cavities or pockets and in crevices in the strata. The gas coming from such pockets and crevices is termed "feeder" or "blower" gas.

GEOLOGICAL CONDITIONS

Gas, Oil and Water—The strata of the earth's crust form a great natural reservoir for gas, oil and water. These collect in the formations, in the order of their relative densities. As illustrated in the accompaying figure, which represents an ideal geological section, the water collects in the rocks below, the oil next above, while the gas is found higher on the anticline.



AN IDEAL GEOLOGICAL SECTION

This condition is only true, however, in a general way, depending on the nature of the strata and their power to absorb and hold these elements. Water, and oil to a less extent, find their way by gravity to a "hard-pan" or stratum impervious to them; while gas drains to the surface and escapes, unless confined by an overlying stratum of clay or impervious rock. The subterraneous drainage of water and oil, from the overlying rocks into the synclinal basins, creates enormous pressures, which are exerted more or less equally on the water, oil and gas.

Water Level—In every geological section, there is a more or less defined "water level" or depth at which water is found in quantity. Wells or boreholes sunk to this general level strike a usually abundant supply of water. The same is true, but to a less extent, of oil, in oil regions. The flow of oil, in oil-bearing rocks, however, is not as free as that of water, owing to its viscosity and limited supply.

The water level is not constant, but varies according to the changing supply or surface drainage, being higher in wet seasons and lower in seasons of drought. As the oil floats on the water any change in water level is accompanied by a similar change in the oil supply. It is due to this fact that exhausted oil wells often become productive in a season of flood, and producing wells frequently cease to flow in a prolonged season of drought.

The Coal Age Pocket Book

HYDROCARBON GASES

General Formulas of Hydrocarbon Gases—Carbon (C) and hydrogen (H) unite in different ways to form groups of compounds, having certain distinct characteristics. Such are the "paraffins," represented by the general formula C_nH_{2n+2}; the "olefines," C_nH_{2n}; the "acetylenes," C_nH_{2n-2}; and other compounds of less importance in mining, as the "benzenes," "naphthalines," etc.

Occurrence and Formation—Methane (CH_4) and ethane (C_2H_6), which will be described later, belong to the paraffin or fatty group, while olefiant gas (C_2H_4) belongs to the olefine or oily group. These are all products of the destructive distillation of organic matter. Methane is often seen bubbling up from the bottom of stagnant pools, in marshes, which fact suggested the name "marsh gas." It is the result of the slow decay of the vegetable matter (in the presence of water), at the bottom of the pool.

On the other hand, olefiant gas is the result of the dry distillation of gas from organic matter, which takes place less frequently in the strata, owing to the almost invariable presence of moisture. The character of these hydrocarbon gases, moreover, varies, also, with the kind of organic matter that undergoes decomposition.

Of the hydrocarbon gases, the paraffins (methane and ethane) are the ones chiefly occluded in the coal measures; while olefiant gas, belonging to the olefine group is rarely found even in minute quantity. Beside the hydrocarbon gases occluded in coal, as has been stated, varying quantities of nitrogen, oxygen and carbon dioxide have been absorbed.

Condition of Gas Confined in Coal—The results of careful experimental study of coal indicate (Chamberlin) that gas may exist in coal in three different ways: 1. The gas is occluded, in a true sense, or absorbed (possibly condensed) by the coal. 2. The gas is entrapped or held mechanically in the cavities, cracks or pores of the coal. 3. The gas may result from chemical changes going on in the coal.

Escape of Gas from Coal—Experiments made by the Bureau of Mines, by crushing weighed samples of different coals in closed vessels of known capacity, show that coal continues to give off gas for a long time after it is mined. The gas is liberated more freely during the crushing of the coal, which would indicate that much of the gas is held mechanically within the mass. It is also shown that the coal continues to absorb oxygen from the air, during the same period.

Composition of Feeder or Blower Gas—A large number of analyses of gas issuing from coal seams as "feeders" or "blowers" have been made. Gas has also been obtained by drilling holes several feet into the face of the coal. These analyses show a wide variation in the composition of the gas in different localities. Moreover, since the rate of emission of gases varies, the composition of feeder gas is only suggestive of the contamination of the mine air from this cause. An analysis of gas taken from a 10-ft. borehole in the Dorrance Colliery, near Wilkes-Barre, Penn., gave: CH_4, 94.2; N, 3.3; CO_2 1.1; CO 0.1; C_2H_4, 0.4; O, 0.9.

EXAMINATION QUESTIONS

Elementary Questions

(Suggested for Beginners)

Arithmetic

Ques.—What is the daily output of a mine under the following conditions: Time of hoisting, 8 hr. per day; coal hoisted per trip, 5200 lb.; time required per hoist, 50 sec. and, changing cars, 22 sec.?

Ans.—The total time per hoist is $50 + 22 = 72$ sec. Making no allowance for delay, during the day, the total number of hoists is $(8 \times 60 \times 60) \div 72 = 400$. The weight of coal hoisted per day is, therefore, $400 \times 5200 \div 2000 = 1040$ short tons.

Ques.—If 12 men mine 720 tons of coal in 20 days, working 9 hr. a day; how many tons of coal will 9 men mine in 25 days, working 8 hr. a day?

Ans.—The weight of coal mined is proportional to the number of men working, the days worked, and the hours per day. Therefore, the ratio of the weight of coal mined is equal to the ratio of the men, times the ratio of the number of days, times the ratio of the number of hours per day; or, in this case, calling the required weight of coal mined x

$$\frac{x}{720} = \frac{9}{12} \times \frac{25}{20} \times \frac{8}{9} = \frac{5}{6}$$

$$x = 720 \times \frac{5}{6} = 600 \text{ tons}$$

Gases

Ques.—What is a gas?

Ans.—A gas is an aëriform fluid, distinguished from a vapor only as being invisible, while vapors are visible, appearing as a fog, mist or cloud.

Ques.—Name the important mine gases, giving the symbols of each.

Ans.—Methane, or carbureted hydrogen, commonly called marsh gas (CH_4); carbon dioxide, formerly called carbonic-acid gas (CO_2); carbon monoxide, formerly called carbonic-oxide gas (CO); hydrogen sulphide, or sulphureted hydrogen (H_2S); olefiant gas, called also ethylene or ethene (C_2H_4); ethane (C_2H_6); besides the nitrogen (N_2) and oxygen (O_2) of the air.

Ques.—Describe briefly the different "damps" known to miners.

Ans.—"Firedamp" is any inflammable or explosive mixture of marsh gas and air, containing frequently varying quantities of other mine gases. "Blackdamp," called, also, "chokedamp" or "stonedamp" is any mixture of incombustible gases heavier than air, the mixture consisting chiefly of carbon dioxide and nitrogen. "Whitedamp" is generally understood as referring to carbon-monoxide gas. "Stinkdamp" is a term used by the miners in reference to hydrogen sulphide. These damps are all more or less mixed with air.

Ques.—Write the chemical equation expressing the reaction that takes place when methane, or marsh gas, burns in oxygen; and show the relative volume of oxygen and methane required for complete combustion; also the volume of carbon dioxide and water vapor produced by the combustion.

Ans.—Following is the equation expressing the reaction that takes place:

$$CH_4 + 2\,O_2 = CO_2 + 2\,H_2O$$

Relative volumes 1 2 1 2

Two volumes of oxygen are, therefore, required for the complete combustion of one volume of marsh gas; and there are produced, as a result of this combustion, one volume of carbon dioxide and two volumes of water vapor.

Ques.—If two volumes of oxygen are required for the complete combustion of one volume of marsh gas; find the relative volume of air consumed for each volume of marsh gas burned.

Ans.—Since oxygen forms 20.9 per cent. of air, the relative volume of air, per volume of marsh gas burned, is $2 \div 0.209 = 9.57$; or, practically, 9½ volumes of air are required for the complete combustion of one volume of marsh gas.

Ques.—What effect has carbon dioxide on a firedamp mixture?

Ans.—Carbon dioxide is an incombustible gas and, by diluting the firedamp mixture, reduces its explosiveness. It is generally stated that if carbon dioxide is added to a firedamp mixture at its most explosive point, the volume of carbon dioxide required to render the firedamp inexplosive is about $^1/_7$ of the volume of the firedamp.

Ques.—What effect has coal dust on a firedamp mixture?

Ans.—The presence of fine coal dust floating in the air has the effect to render the firedamp mixture more easily ignitable and widens the explosive range. Mixtures of methane and air that would not otherwise be explosive, therefore, become explosive in the presence of fine coal dust floating in the atmosphere.

Ques.—Why is coal dust dangerous when allowed to accumulate in mine workings?

Ans.—Under the drying influence of the air current, moisture is absorbed from the dust, which is then easily blown into the air by any consussion, such as a blownout shot or fall of roof. Dust is also raised in large quantities by the ordinary operations of the mine, such as the movement of cars, the passing of men and animals in the traveling ways, etc. The fine dust of the coal, also, readily absorbs oxygen from the air, which increases its inflammability. A sufficient quantity of fine dust floating in the air is often highly explosive without the presence of gas, especially if the coal is inflammable. For these reasons, accumulations of coal dust are dangerous.

Ques.—Are all coal dusts alike inflammable, and what kind of dust is generally the most inflammable?

Ans.—The fine dust of bituminous coal is more inflammable than that of anthracite, because of the larger percentage of volatile combustible matter contained in the coal. The soft bituminous coals also disintegrate more rapidly under the influence of the air than is the case with the harder anthracite.

COAL AND COKE NEWS

Washington, D. C.

Active proceedings before the Interstate Commerce Commission with reference to the proposed 5 per cent. increase in the rates of railroads in official classification territory were opened before the Interstate Commerce Commission on Nov. 24, and bid fair to continue a good while. The first addresses were made by Daniel Willard of the Baltimore & Ohio R.R. and F. A. Delano, receiver for the Wabash R.R. Both men laid especial stress on the financial situation of the roads in official classification territory. Mr. Delano analyzed the classes of freight originating in the section under consideration, and he developed a specially interesting argument with reference to the coal roads, declaring that they could not be classed with other lines operating in the same territory.

The Coal Roads to be Separately Considered

Mr. Delano said: "We have excluded the Pittsburgh & Lake Erie, Bessemer & Lake Erie, Hocking Valley, Kanawha & Michigan, Toledo & Ohio Central, and Wheeling & Lake Erie R.R. These roads are located in a comparatively small area between the Great Lakes and the iron furnaces and coal mines of Ohio, and their traffic is not of a general nature but substantially confined to the products of mining; these products during 1912 forming 78.6 per cent. of their entire tonnage. But the exceptional feature of their situation lies, not only in the volume of this mineral traffic, but in the fact that by reason of hauling iron ore in one direction and coal in the other they have a balanced traffic, which produces an unusually favorable operating condition. While these lines are within the boundaries of the territory, they do not enter into the general railroad situation and cannot be included in a group of roads fairly representative of all the railroads in the territory."

Mr. Delano, however, made no attempt to exclude consideration of the eastern coal roads, although he called attention to the fact that "the combined tonnage of products of mines carried by the Pennsylvania R.R., proper, the New York Central proper, and the Baltimore & Ohio system in 1912 was approximately ten times the same class of tonnage carried by the two principal railroads of New England." It is believed that there will be much controversy with reference to the exact status of the coal roads in the application for rate advances, and as to the extent to which the statistics and experiences of these roads may be taken as typical.

The Paint Creek Investigation

Practical agreement has been reached by the committee which investigated the "Paint Creek & Cabin Creek disturbance in West Virginia" and it is understood that within a week or two a public report will be furnished to the Senate. The information now available is that the committee will assert that American citizens were tried and imprisoned contrary to law, and that martial law was invoked too early. This may lead to a very severe indictment of the Supreme Court of West Virginia.

It will also be found that the mails were interfered with in the coal fields and that the state militia prevented men from getting their mail. The shipment of firearms into the Paint Creek region will also be complained of, and it will be asserted that in taking bodies of strike breakers to the coal fields, peonage was practised.

Coal Lands Restored to Public Entry

The President has restored 242,500 acres of coal land to public entry in Montana and 14,500 in Utah. As a result the coal-land withdrawals have been reduced to 58,000,000 acres. Up to the present 84,000,000 acres have been classified as to their coal value. Out of this area 18,500,000 acres have been declared coal land and valued at $761,000,000, the average price being $41.13 per acre.

HARRISBURG, PENN.

The Interstate Commerce Commission's investigation into the rates and practices of the anthracite coal roads, which was being held at the Bellevue-Stratford Hotel at Philadelphia, was on Thursday adjourned indefinitely owing to the sudden illness of Commissioner John H. Marble who had been presiding. Mr. Marble was seized with an attack of acute indigestion on Wednesday night, the effects of which caused his death at Washington, D. C., on Friday, Nov. 21.

Silas H. Smith, attorney for the commission, announced to witnesses that the investigation would probably not be resumed for two or three weeks, as the hearing of the 5 per cent. advance in the freight-rate case, which begins in Washington on Monday, Nov. 24, may be protracted. Meantime the coal inquiry will wait.

Geo. H. Ross, vice-president of the Susquehanna Coal Co., a subsidiary of the Pennsylvania R.R. was prepared at the time of adjournment to continue his story of the relations between the coal company and the railroad, which he had not completed at the close of Wednesday's hearing.

Representatives of the coal dealers' associations in Ohio, Indiana and Michigan were also prepared to testify. They came to protest against differentials on freight rates, which they claim are against their district.

The counsel for the commission sought to show by witness after witness that anthracite had to pay higher rates than other freight, and operating officials testified in endless repetition of the methods employed in handling coal cars at the various terminals. They told how many locomotives were used, how many empty cars were returned to the region, where the concentration points were and so forth.

It was brought out at the investigation that the Susquehanna Coal Co. has paid but one dividend (4 per cent.) in 12 or 15 years. It owes the Pennsylvania $6,000,000 on which it has given the railroad company no security, but on which it pays 5 per cent. interest. It was also brought out that the Mineral Railroad and Mining Co., another subsidiary of the P. R.R. Co., leased from the Northern entral Ry., another Pennsylvania-controlled railroad, 4900 acres of coal land, on which it has never paid the royalty of 28c. a ton called for in the lease. Mr. Ross further testified that the Susquehanna company makes up the deficits of the Mineral Railroad and Mining Co., and other companies owned by the Pennsylvania.

O. H. Hagerman, shipping agent of the Reading at Port Richmond, Philadelphia, testified that 90 per cent of the cars dumped at Port Richmond are sent away from the docks empty; the other 10 per cent. leave the port with iron ore.

The following are the principal facts appearing in the testimony of the witnesses examined:

Summary of Principal Testimony

That the abolition of free storage has reduced the number of standing cars in the Perth Amboy and South Plainfield yards of the Lehigh Valley by more than one-half.

That the Reading Ry. is in need of more coal cars, but does not get an additional supply because it has no room for storage during slack time.

That only Reading coal is stored in the Clearfield storage plant of that road, although it is supposed to be open to every coal shipper for such purpose.

That only such coal as is ordered is allowed to enter the yards of the Reading at Port Richmond, all other anthracite being detained at the Woodlane yards.

That actual demurrage is charged upon cars not yet placed, though the law states distinctly that such charges cannot be made until the car is in actual placement.

That coal shipped to Buffalo pays $2 a ton freight, the buyer receiving a rebate of 25c. from the railway-owned coal companies, in order that the rate of $1.75 by all-land routes may be met.

That the independent coal companies cannot afford to do this and that in consequence they withdraw from the Central States field almost every winter thus producing an artificial coal famine.

That the railroad-owned coal companies send out a monthly circular fixing prices at identical figures.

Mine Caves

In a test case filed in Scranton, the supreme court will probably be called upon to decide whether a coal company is responsible for injury to person caused by a disturbance of the surface. It is the first suit of the kind to be instituted.

Mrs. James Kirwin, of Scranton, states in her petition that on September 12, 1913, a foreman for the Lackawanna Coal Co. rushed into her house and told her to get out quickly, as they were going to let the house down. She asked him to delay the work for a short time, but in the meantime a shot was fired in the mine and the building sank. The kitchen stove exploded and the castings were hurled about the room, injuring and disabling her. She asks that she be compensated to the extent of $25,000.

The courts have decided that where property is damaged

by mining the owner can have no redress, in case he waived his right to collect damages, but no case is known where such caving resulted in personal injury. The outcome of the suit will be awaited with great interest.

The State Highway Department has joined with the Water Supply Commission and the Department of Mines in an effort to check the trouble caused by the washing of culm into streams, in the anthracite region of the state. Great losses have been caused in the past by the constant washing of the culm. Getting into the streams it causes them to fill up, and as this changes the level of the water it makes necessary the constant altering of the roads and bridges along the line of the water courses. Aside from this there is the pollution of the water.

With the idea of finding a way in which a remedy could be applied, an inspection of Shamokin Creek, from Sunbury to Mount Carmel was made by representatives from the three departments recently.

The Lehigh Canal, between Mauch Chunk and Easton, had to be closed for the season, due to the culm and other pollution in the canal, which was washed in by the severe storm of last Sunday. It was deemed advisable to take this course so that the water could be drawn and the bed properly cleaned.

PENNSYLVANIA

Anthracite

Nanticoke—Concrete walls have been erected in a section of the Auchincloss colliery of the Delaware, Lackawanna & Western R.R. Co., coal department, where a mine fire has been raging since last Monday. It is thought that with the erection of the wall the fire will be smothered within a few days.

Pittston—The Pennsylvania Coal Company is about to build a dozen or more homes along the river bank to be occupied by the foremen at No. 14 colliery.

Edgar C. Weichel and George V. O'Hara, foremen for this same company, have commenced their work at the Y. M. C. A. in preparing young men to take the examinations as mine foreman and assistant mine foreman, next spring.

Scranton—Orders have been issued by the Delaware & Hudson Coal Co. to all monthly hands who keep expense accounts that hereafter they will have to dispense with their chickens, cows, pigs and other animals if they want to remain on the company payroll. Various reasons are assigned for the order, but the one most generally accepted is that the expense accounts of such employees have been increasing regularly during the last year or two.

Wilkes-Barre—A miner who has been in jail for several days on a charge of changing tickets on mine cars and having them credited to himself was given a habeas corpus hearing before Judge Fuller on a charge of larceny, and although the evidence of witnesses was strongly circumstantial it was not sufficient to confine him and he was released on his recognizance to appear at the next term of Court.

The defendant was employed in the Dorrance mine and was charged with having his tickets on 30 cars, while it was claimed that he had only been furnished with 16 cars. The arrest was made at the instance of Charles Lahr, check docking boss for the Dorrance local of the U. M. W. of A.

Bituminous

Nant-y-Glo—Fire destroyed the plant of the Springfield Coal Co., on Nov. 15, doing $10,000 damage and throwing 200 men out of employment. Rebuilding was commenced immediately.

Du Bois—The miners of District No. 2 of the U. M. W. of A. declare that the next agreement will require the operators to deliver cars at the face. Seven hundred miners have gone out at the Tyler mine of the Cascade Coal & Coke Co. to compel the rest of the men to join the union.

Burgettstown—The Wabash Coal Co., of Carnegie, has sold all its holdings comprising 3700 acres lying between Hickory and this town to J. A. Bell, of Carnegie for $20 an acre. The principal stock holders are H. J. Verner estate, W. F. Sossong, T. Beadling, F. and M. Bruening, Dushane & Lewis.

Waynesburg—A deed was placed on record in this county during the week transferring 395.04 acres of land in Jefferson Township. The consideration of the deal was $274,000. The property was purchased by the H. C. Frick Coke Co. from the Pittsburgh-Buffalo Co. and comprises the coal underlying 12 tracts of land, part of which faces the Monongahela River. The H. C. Frick Coke Co. also placed of record a deed for 4.05 acres of coal in the same township purchased from the Johnetta Coal Co. for $1000. Both deeds bore the date of Oct. 31, 1913.

WEST VIRGINIA

Mable—At the request of the stockholders of the Brady Coal Co., Judge Warren B. Kittle, of Elkins appointed A. N. Humphries, of Philippi, receiver for the coal company.

Charleston—Following a conference between representatives of the Kanawha and New River coal operators and President George W. Stevens of the Chesapeake & Ohio R.R., held at White Sulphur Springs, M. T. Davis, John Laing and G. H. Caperton, a committee of the operators left for New York to appear before the board of directors of the railroad to urge immediate action in the improvement of car facilities.

MARYLAND

Cumberland—Surveys are being made for a new railroad through the mountains of Pennsylvania and the little hamlet of Cook's Mills, eight miles west of Cumberland. It is to be known as the Buffalo Coal & Lumber R.R. The line is to open up for development a big section of timber and coal land hitherto untouched by a railroad.

ALABAMA

Gadsden—Captain J. M. Elliott, who for six months has been investigating deposits of coal in Blount mountain, twenty-five miles west of Gadsden, reported that three seams, with a total of 11 ft., have been uncovered at the outcrop and that extensive driling will be undertaken at once.

Birmingham—The only specially equipped motor mine rescue car in the service of the government, arrived in Birmingham recently. This car is built especially for mine rescue work, and can be used to convey injured persons to the hospital. Alabama is practically the only mining section where every mine can be reached by automobile. This car has been attached to the West End rescue station operated by the government, and a trial trip was made recently, to Tuscaloosa and back, a distance of 120 miles, which proved satisfactory in every respect. Accompanying the Engineer in charge, E. B. Sutton, were Chief Mine Inspector C. H. Nesbitt, several assistant mine inspectors, and representatives of the various newspapers. If the car proves a success, it is probable that the government will supply them to their other mine rescue stations in other sections.

It is stated that the Tennessee Coal, Iron & Railroad Co. has recently received several large orders for steel rails, which means that the rail mill will continue in active operation. Their coal mines must be run at full capacity to keep the rail mill supplied with coal.

OHIO

Columbus—Notification by operators engaged in lake trade has been received stating that the American Marine Underwriters will insure lake vessels sailing in December at 1% up to Dec. 4, and 1½% up to Dec. 8, after which vessels will not be insured. These dates are somewhat later than usual and will permit a larger tonnage to be shipped to the Northwest. The vessel owners in certain cases will lay in their boats about Dec. 1 and will take no chances on another trip.

ILLINOIS

Duquoin—A. R. Byrd & Sons Co. of St. Louis have taken options on 17,000 acres of untouched coal land in Perry County, most of which is southwest of this point. According to the present arrangement, a mine will be sunk on the Birkner Farm west of here and another one on the Smith farm southwest of this point. It is understood that the operating company will be capitalized for $850,000.

Belleville—The largest judgment ever paid in the Circuit Court at Belleville was that in the case of Patrick Grannan against Donk Bros. Coal & Coke Co. for $15,000. Grannan suffered a broken back in a mine accident, and at the trial was brought into the court room on a stretcher.

The bursting of the cylinder of the hoist at the Massie mine a week ago has finally caused the operators of this property to install an entirely new hoisting apparatus, and the mine will be shut down for two or three weeks as a result.

Auburn—The Auburn & Alton Coal Co. and 63 other coal operating companies are testifying before Examiner R. T. Eddy of the Interstate Commerce Commission, seeking to obtain an order from the commerce court directing the railroads, chiefly the Atchison, Topeka & Santa Fé, and 48 other connecting lines, to establish a rate for transporting coal from points north of the southern boundary of Christian County to Peoria, Chicago and other gateways to the west and northwest, which will be 15c. a ton less than the rates from points south of that line. The railroads have quite an array of talent to oppose the petition.

INDIANA

Princeton—The Princeton coal mine is tied up by the walkout of the 14 operators of the coal-digging machines. The machinemen asked for a guaranty of $3.34 a day, which has been cut off because the company says some of the men are not giving a full day's work. The men had resumed work several days previously pending arbitration but walked out again, adding to their other demand one that the company furnish a bit carrier to deliver the bits to each machine. The company contends there is no contract for this and it is not customary. Conference between operators and miners was arranged to take place at Terre Haute to consider these grievances. The mine is owned by the Deep Vein Coal Co. of Terre Haute, but is leased and operated by the Princeton Coal Co. About 250 men are employed.

ARKANSAS

Spadra—All the semi-anthracite mines in this section have settled their labor troubles with the exception of one, and it is expected that their controversy will be settled by the first of the month.

KENTUCKY

Morganfield—The Jackson Coal Co., of Fort Branch, Ind., has purchased the old Thomas mine near here, and has announced that it will resume the operation of the property as soon as possible.

Louisville—Suit for damages of $33,290.50 has been filed by the Schwind Brothers' Coal Co. against the Continental Fuel Co., the retail concern alleging that the defendant company failed to comply with its contract to furnish coal to the plaintiff according to orders. It is alleged that shipments were less than ordered to the following amounts: July, 1080 tons; August, 2120 tons; September, 4040 tons; October, 3360 tons.

WISCONSIN

Milwaukee—This year's receipts thus far are the largest on record. About all the dock property suitable for the coal transshipping trade has been absorbed and until harbor development yields more dock frontage, there is little chance for expansion. The last remaining dock site on the South Menominee Canal, which is in the heart of the coal-shipping district, has just been purchased by the Northern Coal & Dock Co., a subsidiary of the Youghiogheny & Ohio Coal Co., an independent producer in the bituminous field. The tract has a frontage of about 275 ft. on the canal and nearly 1000 ft. on a slip adjoining the property on the west. The new dock will be equipped with the latest and best hoisting machinery and ample railway trackage. The Y. & O. Co. now occupies dockage belonging to the Milwaukee Gas Light Co., on the north bank of the Menominee River.

MISSOURI

Whiteside—Arrangements are being made here to establish a fireclay plant taking fireclay and coal out at the same time. The project has been undertaken by James Kelly, representing St. Louis capitalists, and P. M. Modisett, of Hannibal and W. D. Dent, of Oakwood, Mo.

OREGON

Josephine County—The decision of the General Land Office as regards about 9000 acres of coal land entries, in the Squaw Creek section, is awaited with much interest. Representatives of the U. S. Geological Survey have been in the field all summer and fall, having recently completed their work. They found a good grade of coal, some of the samples being of a first-grade coking product. Local men that worked with the Survey state that there is no question but that the land will be allowed to go under the coal act, and if that is the decision of the Land Office it means a new coal field for Oregon. Railroad surveys have been made into this section, to get the land open to entry.

FOREIGN NEWS

Paris, France—Forty-five thousand coal miners are on strike in the Lens district, having responded to the call of the union. The government, fearing serious disturbances, has ordered a regiment of infantry to the vicinity. To end the strike an 8-hr. workday bill was passed by the Chamber of Deputies, Nov. 24, and also another bill making overtime optional.

Halifax, Nova Scotia—An agreement involving 10,000 men employed by the Dominion Coal Co., and represented by the Provincial Workmen's Association, has been reached. The agreement renews the present understanding for three years, or until Dec. 31, 1916. The company has granted an increase of 6 per cent. to all workmen in and about the mines working under $2 per day, making a minimum rate for mine laborers of $1.70 instead of $1.60 per day, and an increase in the minimum rate of the shift men from $1.75 to $1.85 per day.

RECENT COAL AND COKE PATENTS

Gas Producer—H. F. Wallmann, Chicago, Ill., 1,072,536, Sept. 9, 1913. Filed July 21, 1906, Serial No. 327,229.

Gas Producer—J. A. Herrick, New York, N. Y., 1,073,124, Sept. 16, 1913. Filed Feb. 4, 1911. Serial No. 606,548.

Coke Oven Door—H. Kickert, Herringen, Germany, 1,072,857, Sept. 9, 1913. Filed Dec. 21, 1912, Serial No. 738,003.

Coal Loader—P. R. Jordan and W. Wright, Adamsville, Ala., 1,072,731, Sept. 9, 1913. Filed Aug. 22, 1912, Serial No. 716,527.

Automatic Traveling Load Scale—Henry Richardson, New York, N. Y., 1,072,500, Sept. 9, 1913. Filed Mar. 24, 1910, Serial No. 551,347.

Traveling Grate Furnace—S. J. Misener, Woodside, Nova Scotia, Can., 1,073,359, Sept. 16, 1913. Filed Mar. 29, 1912, Serial No. 687,244.

Dynamo-Electric Apparatus for Firing Mines—K. Schaffler, Vienna, Austria-Hungary, 1,072,511, Sept. 9, 1913. Filed Feb. 4, 1913, Serial No. 746,200.

Improvements in Machine for Charging and Discharging Gas Retorts. Riter-Conley Manufacturing Co. 15 Exchange Place, Jersey City, U. S. A., 17,855 of 1912.

Water Cooled Furnace Door Frame—L. L. Knox, assignor to Knox Pressed and Welded Steel Co., Niles, Ohio, 1,073,144, Sept. 16, 1913. Filed Aug. 4, 1911, Serial No. 642,339.

Improvements in the Treatment of Gases from Coke Ovens and of Like Gases and the Recovery of Products Therefrom. W. H. Coleman, 3 Redclyffe Road, Withington, Manchester, 20,900 of 1912.

PERSONALS

Irving R. Gard, for between two and three years with the Canadian Collieries (Dunsmuir) Limited, Victoria, B. C., has retired from that company's employ, the important hydro-electric system and other construction work on which he was engaged being now practically completed.

Official announcement was made from the offices of the Berwind-White Coal Mining Co. at Philadelphia, relative to the resignation of Walter R. Calverly as general superintendent of the mines in this vicinity as follows: "The duties of the position formerly held by Walter R. Calverley at Windber have been divided among the present employees, and the office of general superintendent, as held by him, has been abolished.

John W. Swift, special disbursing agent of the United States navy with the Matanuska coal mining expedition, was in Seattle about the middle of October buying horses, sleds, and other equipment needed for the transportation to a shipping port of some of the coal taken out last summer from the government's experimental mine, in the Matanuska field. It is expected the whole winter will be occupied in hauling the coal to Cook inlet, where it will be loaded on barges.

CONSTRUCTION NEWS

Johnstown, Penn.—The Sunnyside Coal Co. will put electric haulage and machines in their mines.

Carroltown, Penn.—Logan Coal Co. is making extensive improvements at its mines at Beaverdale.

Two Rivers, Wis.—Wisconsin Dredge & Dock Co. have been excavating for the new coal-dock extension here.

Milwaukee, Wis.—The Youghiogheny & Ohio Coal Co. is to expend half a million dollars in the construction of new coal docks.

Rockwood, Penn.—The Consolidation Coal Co. has com-

menced erection of a new coal tipple at its mines at Wilson Creek.

Belle Vernon, Penn.—A new coal crusher is soon to be installed at Somers No. 4 mine of the Pittsburg Coal Co., at Pricedale.

Carbondale, Penn.—Alterations will be commenced at the new breaker of the New England Coal Co., which is being erected on the tract formerly owned by the Salem Hill Coal Co.

Wellsburg, W. Va.—The Carmichael coal mine, on Bethany Pike, about four miles from Wellsburg, will be completely reëquipped with electrical mine machinery, the work to be started in a few days.

Birmingham, Ala.—The Tennessee Coal, Iron & R.R. Co. is about to add to its equipment a 40,000-cu.ft. motor-driven centrifugal air compressor. This unit was recently ordered from the General Electric Co.

Pruden, Tenn.—The Pruden Coal & Coke Co. expects to install in its power plant a 200-kw. alternating current General Electric generator with 7-kw. exciters, 150-kw. motor-generator set and the necessary switchboard.

Duquoin, Ill.—The Forester Coal & Coke Co. has contracted with the Roberts & Schaefer Co., of Chicago, for coal handling equipment for a new boiler plant at the mine where a Marcus tipple is now under construction.

Vancouver, B. C.—New York capital has been raised for the completing of the Portland Canal & Northeastern Ry., building of which was started three years ago as a private enterprise of Sir Donald Mann. The line will be extended a hundred miles to tap the anthracite coal fields of the Ground Hog Mountain.

McDonald, Penn.—The American Zinc & Chemical Co. is preparing to sink a shaft and operate a coal mine about two miles from Burgettstown. George S. Baton & Co., of Pittsburgh, are the mining engineers. It is believed that this mine will be ready for operation about June of the coming year.

Birmingham, Ala.—The Sloss Sheffield Steel & Iron Co. will build 300 coke ovens of the beehive type at their Bessie mine, in Jefferson County. These ovens will take the place of the battery of ovens at their city furnace in the heart of Birmingham, which the Sloss company has agreed to abandon operating to abate the smoke nuisance.

Rossiter, Penn.—The Clearfield Bituminous Coal Corporation recently purchased from the General Electric Co. equipment for its mine, consisting of two 750-kv.-a. Curtis turbo-alternators with 17.5-kw. motor generators and 15-kw. turbo-exciter sets, three 300-kw. motor-generator sets, three 250-kv.-a., three 30-kw., and three 25-kw. transformers, switchboard apparatus, etc.

Columbus, Ohio—The Sunday Creek Co. has started to make new openings at mine No. 301 at Congo, Ohio, which was damaged by a disastrous fire recently. The officials of the company announce that the production of 3000 tons daily has been curtailed for some time. When the fire was discovered another mine known as No. 302 across the creek was sealed and thus saved.

Salt Lake City, Utah—The Utah Fuel Co. expects to add soon to the power-plant equipment at Castle Gate, Utah, a 625-kv.-a. Curtis turbo-generator, a 200-kw., two-unit, three-bearing motor-generator set equipped with Tirril regulator, switchboard, etc. The contract for the above machinery has been awarded to the General Electric Co., both as to furnishing the machines and their installation.

Sandusky, Ohio—Ground was broken recently on the Lower Lake Dock Co.'s premises in West Sandusky, for improvements, which, when completed, will cost nearly, if not quite, 1,000,000. Additional coal-loading facilities are to be installed before the opening of the 1914 navigation season.

In order that it may reap the full benefits of the additional facilities the Pennsylvania R.R. will enlarge its West Sandusky yards so that twice the amount of coal received daily from the mines in southern Ohio and West Virginia at the present time may be stored.

Hudson, Penn.—Plans are underway for the erection of a breaker along the main line of the Delaware & Hudson R.R. The structure will be built for the Wolfe Coal Co. A lease has been secured by this company on a tract of land situated between the Delaware colliery of the D. & H. Co. and Laflin Borough.

The breaker will be equipped with modern machinery. The output of the colliery will be transported from the breaker to market over the D. & H. R.R. and the work of construction will commence as soon as a branch track has been laid.

INDUSTRIAL NOTES

Brazil, Ind.—The American Coal Mining Co. of this city has increased its capital stock $30,000.

Sharon—The Knox Pressed & Welded Steel Co., was recently granted a license to manufacture and sell coal pulverizing equipment.

Hazleton, Penn.—The Harleigh-Brookwood Coal Co. operating mines near Hazleton, has notified the State Department that it had increased its debt from $155,000 to $1,500,000.

Milwaukee, Wis.—The Northern Conveying Machinery Co. has changed its name to the Maniere Engineering & Machinery Co. Its new offices will be 709-10 Manhattan Bldg., Milwaukee, Wis.

Buffalo, N. Y.—J. N. Sechrest & Co., brokers, will finance the proposed railroad and coal mines of the Manchester Mining & Manufacturing Co., the road to extend 65 miles from Barboursville, Ky., to the line of the Louisville & Nashville R.R. at Beattyville.

Bellaire, Ohio—A syndicate of Columbus, Zanesville, and Mount Vernon capitalists are looking over the available coal lands in Belmont County, for the purpose of developing and mining. It is reported that very little available coal land in that section can be found.

Columbus, Ohio—An entry in the state to have the ownership of the Sunday Creek Co. now held by the Hocking Valley Ry. and the Toledo & Ohio Central R.R. Co. dissolved, is expected to be put on the court records soon. At that time steps will be taken to have the stock sold in some manner agreeable to the court.

Hartford, Conn.—The Terry Steam Turbine Co. has just started operating on a 23-hour per day basis, the one hour of idleness being from six to seven in the morning. It is found necessary to do this in order to clear the shop from the present crowded condition, due to congestion of orders during the past few months.

Bangor, Penn.—The S. Flory Mfg. Co. has erected temporary buildings at their works at this place, equipped the same with improved high-grade machinery, and is now ready to take care of orders as in the past. The business will be continued, and permanent buildings erected as soon as possible. The temporary plant was made necessary by the burning of the plant a short time ago.

NEW INCORPORATIONS

Coeburn, Va.—The Litz Coal Corporation, Coeburn, Va., has ben incorporated, with a capital stock of $100,000, to develop coal lands.

Chattanooga, Tenn.—The Pineville Coal Co., of Chattanooga, Tenn., has been incorporated to develop coal properties. Capital stock is $300,000.

Newark, N. J.—The Manufacturing Coal Co. is about to be incorporated. Capital stock will be $50,000, and John T. Harland, Newark, is incorporator.

Farmersburg, Ind.—The Farmersburg Coal Co. has been incorporated with $10,000 capital stock to mine and deal in coal. The directors are Bert Wood, M. McNeely and Ira Drake.

Frankfort, Ky.—Articles of incorporation have been filed by the Independent Ice & Coal Co. Richard Callissi, Mabel McCabe and George W. Steinhauer are the incorporators. Capital stock is listed at $5000.

Akron, Ohio—The Summit Coal & Supply Co. has been incorporated, with a capital stock of $10,000, to deal in coal, grain and feed. The incorporators are Francis Sieberling, J. B. Huber, W. E. Slabaugh, S. A. Allen and James C. Engleman.

Glen Campbell, Penn.—A charter has been granted to the Superior Coal Co., of Glen Campbell, Penn. It is capitalized at $50,000, and the incorporators are H. E. and J. O. Clark and H. J. Ehrlich, of Glen Campbell, and C. S. Hampton and Harry T. Rodenberry, of Philadelphia.

Clarksburg, W. Va.—The Norwood Coal Co., with its chief works in Harrison County, has been incorporated for the purpose of owning land and operating coal mines. It is capitalized at $10,000. Carl L. Horner, C. B. Stout, J. L. Horner, W. H. Wolverton and C. B. Johnson, all of Clarksburg, W. Va., being the incorporators.

COAL TRADE REVIEWS

GENERAL REVIEW

Anthracite strong with the circular being well maintained and some grades commanding substantial premiums. Bituminous moving well on contracts. Prompt market dull but sellers in control. Weather conditions favorable to a large movement and adverse to consumption. Car supply easy in all parts of the country.

Anthracite is strong all along the line with prices generally well maintained and some premiums in effect. Stove coal is the feature of the hard coal market; it is in short supply all over the East, and commands a good price at all points. Production in the mining regions is heavy, but consumption is keeping pace with the output, and no important accumulations are noticed. It is essentially a weather market in anthracite, and indications point to a brisk business shortly.

The bituminous market is stationary but holding moderately firm with prices on a profitable basis. The conservatism of operators in closing contracts when a period of high prices seemed inevitable has left a rather abnormal amount of free coal in the market. In addition to this the bituminous consumers have been threatened so often with a shortage that they are well stocked as a rule, while comparatively mild weather has decreased the consumption. A brisk export business on the Atlantic Coast is helping to relieve the situation, but the general trend is undeniably toward softer conditions, and most agencies are quietly canvassing for orders.

The combined effects of the reduced lake shipping, due to the derangement in vessel movement as a result of the unprecedented storm, a slowing down in iron and steel, as well as general industrial manufacturing and a full car supply permitting uninterrupted operations has resulted in developing a surplus in the Pittsburgh market. Instead of asking a premium on the October circular, most operators are now prepared to shade these prices on spot business. While the market is holding relatively firm, the demand is light; dealers are of the opinion, however, that they can maintain prices providing the warm weather does not continue well into December. Consumers are making every effort to control the market, but no important break has occurred as yet.

Steam business in Ohio continues as active as ever. Retail trade as a rule is flat, but stocks are not heavy, and many dealers are trying to accumulate surplusses. There is still a heavy demand from the Northwest, and lake shippers are making every effort to get all the possible tonnage off before the closing of navigation, Dec. 1; arrangements are being made for continuing some shipping even after this date. The movement at Hampton Roads has been unusually heavy; some of the larger operators are having difficulty in getting sufficient coal to meet their contracts, and there is little in the way of free tonnages to be had.

A continuation of the warm weather has created a soft market in the Middle West, and mines are being forced to reduce operation; steam prices are lower and a cut is threatened in domestic coal. As a rule, however, requirements on contracts are being maintained at a good average, and the situation hinges greatly on the appearance of some winter weather.

EASTERN MARKET

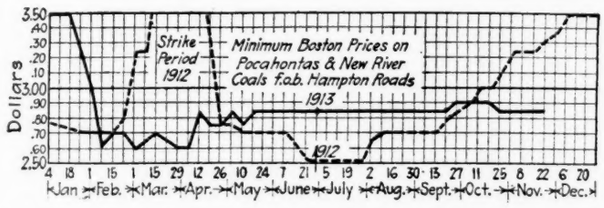
BOSTON, MASS.

Bituminous generally quiet and no near prospect of change. Georges Creek in ample supply but firm in price. Best Pennsylvanias offered freely for spot delivery and this is regarded as significant. Anthracite strong with the lack of stove still the main feature.

Bituminous—This is a listless market and Hampton Roads coals especially are facing a quiet season. New England consumers have more than once this year been induced to buy against threatened shortage and now they find themselves thoroughly well-stocked, in many cases much more so than they wish. There are also signs that some of the agencies are quietly canvassing for orders and there is likely to be an abundance of free coal for several weeks ahead. Some of the shippers were extremely cautious over the amount of contract business they would take in the spring and hence there is probably a larger volume of winter coal available than would otherwise have been the case. There is a more brisk call for export just now and this will help materially to keep the coastwise market steady in the face of light business here.

Georges Creek is moving regularly on contract, but for spot shipment there is only a moderate inquiry. The usual volume of this grade is on hand at all the piers but with no sign of any wavering in price.

Some of the higher grade Pennsylvanias that ordinarily at this season are rigidly confined to contract are being offered



for December delivery. This is regarded as significant, and it will not be surprising if soon there is not a slight decline in prices. Coal from districts in Clearfield have been offered at 5@10c. less than a week ago, and although only for prompt shipment, it is probable that extended delivery could also be secured. The trend is toward softer conditions on all the Pennsylvanias and unless something occurs to shorten up the output they will probably continue well into December. All-rail trade is only from hand-to-mouth, with a general lack of interest on the part of buyers.

Anthracite—The market continues strong all along the line, the shortage of stove being still the commanding feature. New York shippers are particularly dry of this size and some pinch prices are likely to be heard when the weather turns cold. It was reported here that 50c. premium had been declined for a straight cargo of stove, but the other sizes are continuing at about the company circular. Little or nothing has developed here with respect to individual coal but a change will come if more stove is not to be had from the regular shippers. The territory East of Cape Cod is still drawing its major supply from Philadelphia. The points farther East have probably been earlier cared for than has been the case in recent years and most dealers away from the cities are going into the winter with comfortable stocks. Tows are moving quite regularly now and the summer temperature has let up on the demand from the consumers.

Quotations on bituminous are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahonta New River
Mines*	$1.00@1.55	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.25@2.75	2.50@2.85	2.92@3.02	
New York*	2.55@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.85@2.90
Boston†				3.72@3.82
Providence†				3.72@3.87

*F.o.b. †On cars.

NEW YORK

Soft coal unchanged but rather dull. Mining continues at full rated capacity and car supply adequate. Anthracite dull on tidewater business but active all-rail; stove coal in short supply.

Bituminous—The soft coal market remains quiet, with the demand light but prices moderately steady. There appears to be a fairly good supply of coal at tidewater, although by no means an abnormal amount. An encouraging feature of the situation is that consumers continue taking heavy tonnages on their contracts, in most instances up to the maximum specified; it is also noted that there are a few inquiries for new contracts in spite of the fact that this is not the customary season for placing these. The figures quoted in this new business are 15@20c. above last year's prices.

The car supply in the mining region shows a steady improvement. The situation on the B. & O., which was bordering on the acute a few weeks ago, is now comparatively easy, though still spotty and rather uncertain. No restriction in mining is reported, operations continuing at full rated capacity and limited only by the indifference of the men to work and occasional delays due to the car supply. Mines are comparatively full handed, although most operations report that they could use a few more. Prices continue rather weak, as follows:

West Virginia steam, $2.65@2.75; fair grades of Pennsylvania, $2.75@2.85; good grades of Pennsylvania, $2,85@2.95; best Miller Pennsylvania, $3.15@3.25; George's Creek, $3.20@3.30.

Anthracite—The hard-coal market was exceptionally dull on tidewater shipments although all-rail business to Eastern points continued active. Straight stove for all-rail delivery brought premiums of fifty cents through the individuals and some sales for tidewater delivery were made on the same basis.

The companies were all exceptionally short of both stove and nut, which allowed most of the individual shippers to dispose of egg provided stove and nut accompanied the shipments. Many of the local dealers complained of dull business, due undoubtedly to the unseasonable weather prevailing, but if real cold weather occurred there is no question but that a famine in stove and nut sizes would prevail. The companies have no stock on hand in the domestic sizes except egg, and for that reason the daily production on stove and nut would necessarily have to take care of the demand and as this increases, the situation on these sizes will become more acute. The suspension of Lake shipments may help to relieve the situation, but on the other hand the demand on all-rail shipments to other points will probably prevent any noticeable change in the local situation. Considering the small supplies held by the large companies at this time of the year, and the possibility of a severe winter before us, it is the opinion among the conservative element that premium prices will prevail on individual coals before the year is out.

Steam sizes except pea were long on the poorer grades and even high-grade coals found difficulty in prompt disposition. The opinion is expressed by many in the trade that although premiums may be obtained later, on the popular sizes in the domestic coals, there will be no difficulty for consumers to obtain their supplies of the steam cofas at normal prices with a possible exception in the higher grades, which usually are short during a severe winter. However, the contemplated trouble in the bituminous fields this coming year may have a tendency to bring better prices and an unusual demand for all grades of steam sizes, but there is no likelihood of this being felt until February or March.

The local market is now quotable as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular*	Individual
Broken	$5.00	.....	$4.95	
Egg	5.25	$5.10@5.25	5.20	$5.00@5.20
Stove	5.25	5.25@5.75	5.20	5.20@5.70
Chestnut	5.50	5.50	5.45	5.45
Pea	3.50	3.50	3.45	3.50
Buckwheat	2.75	2.60@2.75	2.45@2.70	2.15@2.70
Rice	2.25	2.15@2.25	1.95@2.20	1.70@2.20
Barley	1.75	1.60@1.75	1.70	1.40@1.70

*An addition of 2½% is required on the prepared sizes in this column to cover the new Pennsylvania state tax.

BALTIMORE, MD.

The soft-coal market remained about stationary, but on a rather poor basis. Slack was a little farther off, and coke was selling very cheap. Little demand for anthracite above immediate needs.

There was little change in soft coal conditions here the past week. The market on the whole remains unsatisfactory, demand being light and prices considerably off what they should be for the season. Efforts on the part of West Virginia producers to get rid of slack in the face of the lessening demand for that fuel, caused it to go off a little more. Sales as low as 85c. were recorded.

As a whole the gas-coal market in West Virginia stood about as last week. Run-of-mine was selling around 95c., and three-quarter anywhere from $1@1.10. Pennsylvania steam fuels sold at various prices from $1.05@1.15, although the market was dull at those figures.

Coke now stands about the worst figure of the market. The lessened demand of the steel industry, as typified here by the closing of the rail mill of the Maryland Steel Co., during the past week, has hit the coke trade hard. First-grade Connellsville cokes were being offered freely at from $1.75@1.80. West Virginia cokes were often going begging at $1.60.

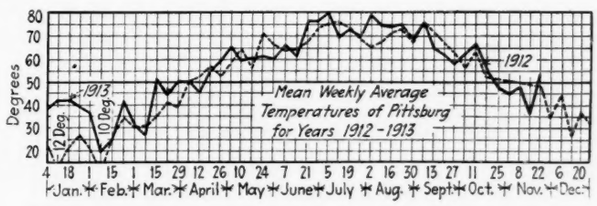
Waterfront business here is not as good as could be desired. A drop off in the number of tramp steamers calling at the port recently has caused a decrease in bunker demand.

CENTRAL STATES

PITTSBURGH, PENN.

Demand reduced. Car supply suddenly becomes plentiful, and prices being cut below the list of October, sometimes to the earlier basis. Lake shipments smaller than expected for November. Connellsville coke soft, with prices quotable 10c. lower.

Bituminous—The market has softened very considerably in the past week, owing to a variety of causes. In the first place, a softening tendency at this season was to be expected, and would in normal circumstances be spread over a period of several weeks. This year, however, a very severe storm occurred, Nov. 9, tying up the railroads quite largely and causing a temporary shortage of coal, which stiffened the market or at least arrested the softening tendency, while now the accumulated effect of the progress of the season is suddenly exerted. Lake shipments have been reduced on account of the storm on the lakes, of unprecedented severity, vessels being lost and the movement of surviving vessels much interfered with, so that the total of lake moved this month is proving much less than expected. Cars, however, have suddenly become quite plentiful, and there is scarcely any curtailment of operation on account of inability to get cars. Iron and steel mill operations have been decreasing rapidly and industrial activity generally has undergone some decrease. All these influences have been felt in the coal market, and prices have naturally suffered. Instead of premiums being secured on prompt coal over the advanced prices put out at the beginning of October there has been a disposition to shade those prices, and in some instances sales have been made at the old season price, based on $1.30 for mine-run. Operations at mines are slightly less than they were three weeks ago, although with the supply of cars and men they could easily be much greater. Demand is now regulating mine operations, instead of the limited supply dictating the price. We quote: Mine-run, $1.30@1.40; ¾-in., $1.40@1.50; 1¼-in., $1.55@1.65; slack, 90c.@$1, per ton at mine, Pittsburgh district.



Connellsville Coke—The market has lost more ground, the temporary stringency in supplies caused by the storm being entirely relieved last week. Coke is in plentiful supply on contracts, and free coke is being offered around, finding hardly any takers. While the majority of operators still adhere to the policy of holding of as to contracts for 1914 and awaiting the initiative of buyers, a few operators have been actively soliciting furnaces to take hold, and have probably named very attractive prices, well under $2, which seems to be the price ordinarily mentioned in the market as likely to be quoted by sellers in opening negotiations for 1914 furnace coke. Foundry coke has softened in consonance with furnace coke, and thus the whole market can be quoted down about 10c. for the week. We quote: Prompt furnace, $1.75@1.85; contract furnace (nominal), $2; prompt foundry, $2.50@2.75; contract foundry, $2.50@2.75, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Nov. 15, at 336,162 tons, a decrease of 17,883 tons, and shipments at 333,609 tons, a decrease of 33,870 tons.

BUFFALO, N. Y.

Coal business slow due to the warm weather. Bituminous dealers holding firm, but demand light. Anthracite selling fairly well and independents confident of future.

Bituminous—There is little improvement to be expected in the trade so long as the weather continues warm and cars are plentiful. The consumer is trying to control prices and it is a hard matter to hold the market even in the weak condition that has prevailed for a month or so. Still there are no important breaks reported.

There is a steady increase of labor difficulty in all the mining regions. There is no real difficulty in the mines except that the men are uneasy and are seizing on most anything as an excuse to make trouble. In some instances they are demanding more pay.

The market is still dependent on the weather. Dealers are of the opinion that they can hold it where it is, unless the warm weather should continue away into December. Anyhow, after that the time is not far off when consumers will have to store coal. At present they are laughing at dealers who refer to present labor troubles; it is the old dodge, as they look at it. Quotations remain very weak at $2.90 for Pittsburgh lump, $2.80 for three-quarter, $2.65 for mine-run and $2.25 for slack, with slack quite as weak as sizes, on account of the approach of the close of the lake season. Allegheny Valley coal is quoted at from 15 to 25c. lower than Pittsburgh.

Coke—There is no life to the coke market. Consumers still hold that it is too high and it may be well if they can crowd the prices down till steel can be reduced to prices at which it can be sold more freely. Coke sells on a basis of $4.65 for 72-hour Connellsville foundry.

Anthracite—There is no snap to the anthracite trade, because of the warm weather. As a rule the sellers of independent coal are making the most confident reports. Trade is good with them in all of the smaller sizes. Egg is dull everywhere. The charging of the Pennsylvania state tax is often rebated out of that state, even where the seller has adopted the increase.

TORONTO, CANADA

Normal supplies except on some grades of anthracite, which are short. Market quiet but steady.

Business in the local market has been more quiet than is normally the case during this period of the year, due principally to the rather mild weather. Supplies on hand appear to be about normal with the exception of some grades of anthracite, stove coal for instance, which is behind. The retail market is quotable about as follows:

Anthracite, $8; bituminous (steam), $5.25; bituminous screenings, $4.35; domestic lump, $6; cannel coal, $7.50.

In the wholesale market three-quarter lump is quoted at $3.85 f.o.b. cars, and screenings at $3.

TOLEDO, OHIO

Heavy lake shipments. Warm weather having a bad effect on prices although they have been fairly well maintained as yet.

The weather here has been warm and balmy, which has naturally had a deadening effect on the coal market. Domestic demand has been light although steam coal continues active. Lake shippers are working hard in an effort to get as much coal going up the lakes prior to the closing of navigation, which will take place the first of the month, as possible. Coal and ore vessels suffered extremely during the recent storm and railroads were somewhat tied up so that shipments were more or less delayed.

Dealers here are fearful that prices may not be maintained should the weather remain warm, although at present there is no indication of a break in the market. Prices have been holding fairly close to the list. The car situation has improved somewhat and better working conditions are looked for. Prices as quoted here are as follows:

	Pocahontas	Hocking	Jackson	Pomeroy	Massillon	Pitts. No. 8	Cambridge
Domestic lump	$2.50	$2.00	$2.75	$2.25	$2.50	$1.50	$1.40
Egg	2.50	1.35	2.75	1.50	2.50	....	....
Nut	2.00	0.80	2.25	1.75	2.50	1.35	....
¾ lump	....	0.90	....	....	....	1.30	1.20
Mine-run	1.60	1.50	....	....	....	1.20	1.20
Slack	....	0.70	....	....	....	0.80	....

COLUMBUS, OHIO

Some softness developed because of the warm weather. Prices did not suffer on the whole but in some instances lower quotations were given. Domestic lines only ones affected; other departments held up stroug.

The coal trade in Ohio during the past week was rather flat because of the higher temperatures. As a result some of the dealers cancelled their orders placed during the recent cold spell. But a large portion of the retailers failed to cancel believing that the coal ordered would come in handy later on. Retail stocks are not heavy in any section and many of the dealers are trying to accumulate.

Prices did not suffer to any great extent. In most instances the circular figures were well maintained and discounts were few and far between. With the exception of domestic grades, prices were about as strong as earlier in the season.

The lake trade is still active and will continue so until the close of navigation. Some vessels will be put in port for the winter about Dec. 1, while others will make the last trip to the Northwest after that date. The demand for fuel there is still strong and practically no congestion at the docks is reported. Dockmen are making every effort to get a large tonnage to the upper lake ports to avoid a large all-rail movement later.

Steam demand is good in every way and manufacturing establishments are taking about their average amount. Railroads are also fair customers for steam grades as their freight movement is good. Some disposition is shown by some of the larger users of steam grades to accumulate stocks for a protection against a car shortage.

Some slight improvement in the car supply is reported from certain mining districts of the state but this is due more to the better weather which permits a freer movement of coal trains than to any other factor. Operations which depend upon the car supply have been about 55 per cent. in the Hocking Valley and Pomeroy bend and about 50 per cent. of the average in eastern Ohio. Other districts have also been hampered by the car shortage.

Retail trade is as active as could be expected under the circumstances. Retailers prices have not weakened under the influence of milder weather.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$2.00 @ 1.90	.....	$2.25 @ 2.15	$2.00 @ 1.90
3-4 inch	1.85 @ 1.75	$1.50 @ 1.40	2.00 @ 1.90	1.85 @ 1.75
Nut	1.30 @ 1.20	.....	1.75 @ 1.65	1.40 @ 1.35
Mine-run	1.50 @ 1.40	1.25 @ 1.20	1.50 @ 1.40	1.50 @ 1.45
Nut, pea and slack	0.95 @ 0.90	.....	1.00 @ 0.90	0.90 @ 0.85
Coarse slack	0.85 @ 0.80	1.00 @ 0.95	0.90 @ 0.80	0.80 @ 0.75

DETROIT, MICH.

Car supply causing some anxiety. Contracts for new period will be at higher figures. Anthracite easy and coke soft.

Bituminous—Coal is being moved away from the local yards quite as fast as it comes in, so that there are few or no accumulations and the spot market is firm. The car supply is also the source of some anxiety, producers expressing the fear that it may become so inadequate as to make it impossible to ship full tonnages on contracts. Operators claim that contracts expiring after the first of the year will command a premium of 25c. on the old business when renewed. The cold snap locally has materially stimulated business, and prices are strong and inclined to advance.

Anthracite—Hard coal is in good supply, even the stove size which has been so short.

Coke—Coke is weak, Connellsville foundry being quoted down to $1.95, with Semet Solvay $3 and gas house $2.75.

HAMPTON ROADS, VA.

Shortage with the larger shippers still continues. Dumpings for week heavy. Prices remain firm.

The movement from Hampton Roads during the week has been heavy. This is particularly true as regards the movement from Sewalls Point piers. The Virginian Ry. up to date appears to be running close to the dumpings of the Norfolk and Western Ry. It is hardly probable that the dumpings of the Virginian Ry. will run over those of the Norfolk & Western for the month but it is safe to say that their figures will be close. Some of the largest shippers still continue short of coal and are having considerable difficulty to get coal in the open market to take care of contracted tonnage. Prices on New River and Pocahontas are about the same as they have been for the past two or three weeks. This is also true as regards the high volatile coals.

The Norfolk & Western during the last week made their record for fast loading when they loaded the s.s. "Suffolk" at their pier No. 3. A cargo of 7508 tons was loaded in seven hours which is remarkably fast time considering the old style facilities now in use at Lamberts Point. Cargoes moving foreign from Hampton Roads during the week went to: Coronel, Havana, Genoa, Port of Spain and Canal Zone.

LOUISVILLE, KY.

Business light with dealers due mild weather. Stocks accumulating. Steam coals in better demand.

In spite of the fact that winter is near, the coal market is as yet strictly a weather proposition. Warm and pleasant weather for the greater part of the week just past has resulted in a poor demand for domestic coal, the price going off in consequence an average of ten cents a ton on all sizes and grades. Dealers have had little chance to move the stocks stored earlier in the season, and are therefore placing no orders for immediate delivery.

While the same cause has produced a little of the same effect in the steam market, the demand for screenings has by no means gone off as much as that for domestic coal. A pronounced car shortage in Eastern Kentucky several days of last week indicates what may happen when the demand for coal is again normal.

Prices for the better grades range from $2.25 for block to $1.65 to $1.75 for round, f.o.b. mines. Eastern Kentucky nut and slack is selling for 80 and 85c., and Western Kentucky for 70 to 75c. The slow domestic movement is largely responsible for the fact that steam prices are holding up as well as they are, as the supply of screenings is not overlarge, and the demand, as indicated, is hardly normal.

SOUTHERN AND MIDDLEWESTERN

NEW ORLEANS

Increased demand in Latin America and at points along the Southern Pacific Railway stimulates activity in coal circles. Cargo shipments fall off. Guatamala Central ready to buy coal.

A more active demand developed in this market last week. This was due to a greater demand for parcel shipments to Latin American points, call for coal trimmed into bunkers in the harbor and additional orders from western Louisiana and Texas points following the settlement of the Southern Pacific strike.

There was an absence of cargo movement from Mobile or Pensacola last week but coal is being assembled for loading several cargoes next week. The Central Railway of Guatemala is expected to place its order at once. Demand from Mexican points has increased owing to the cutting off of the coal mines in the northern part of that republic. The business in sight is to move to Vera Cruz and Mexico City. Several orders are pending calling for routing via Tampico but owing to the unsettled conditions existent shipment is being deferred.

With the bulk of the cotton crop being handled there is certain to be considerable consumption from ships. Additional facilities for the handling of coal in the harbor are being made which will doubtless add to the number of ships coaling at this port.

INDIANAPOLIS, IND.

Domestic movement satisfactory in all branches. Local market shows little change. Full demand on contracts. Screenings weak, but trade generally firm.

Notwithstanding almost summer-like conditions, there is little complaint in local trade circles, either from buyers or sellers. Domestic coal appears to be a little more satisfactory, and the steam business is also up to normal in spite of adverse sentiments regarding general business. The factories appear to be taking full tonnages on their contracts, and one large producer reports being six weeks behind orders. Mines as a rule are running full time unless delayed by lack of railroad cars; the Big Four R.R. has been the worst offender in this respect but indications are that it will materially improve its service shortly. The public Utilities Commission has entered a complaint to the effect that terminal facilities at Indianapolis are inadequate and will have to be enlarged.

The market on screenings is more unsettled than in any other branch; an urgent order may command 70c., but prices range from there down to 40c., depending some on quality, but, principally, upon demand. Domestic coals have not suffered as yet, because of the mild weather, except, possibly, for a slowing up in some of the small retail business. Mine-run No. 4 is quoted at $1.10@1.25, with sales usually closer to the lower figure; No. 4 domestic lump commands $1.90, f.o.b. mines.

Retail prices have remained unchanged since Sept. 20. The opinion is that they will continue steady to firm although it is noted that Indiana lump is being offered at $3.50 in one instance, the circular being $3.75. The continued warm weather through November is causing a note of anxiety in the trade.

CHICAGO

Continuation of warm weather has created a soft market. Steam prices have been cut 5 to 10c. a ton. Springfield mines have reduced output on account of slack business. Smokeless coal continues strong. Prices for anthracite remain stationary with the volume of business light. Coke market is unsteady.

Indian summer weather has had a softening influence on the market. There has been a drop in prices for steam coal and a cut in quotations for domestic has been threatened for several days. Retail dealers announce that there has been a light demand and this condition has had the effect of weakening the steam trade. Many operators who looked orders from the domestic market have sought to dispose of their output through steam trade channels with the result that considerable strength has been taken away from the latter branch of the trade. Prices for steam lump mine-run and screenings have been trimmed between 5 and 10c. a ton.

Variable prices are being asked for Franklin County coal. Some sales at $2.25, the mines, have been recorded, but the bulk of the business has been handled on the basis of $2. Sales have been reported in a few quarters at $1.90. Springfield operators are getting $1.50 for domestic lump coal in Chicago and $1.65 to $1.75 in the country. A majority of the Springfield mines are running only two or three days a week on domestic sizes on account of slack business.

Demand for splint coal has lessened to some extent. All-rail coal is still sold in competition with the dock coal as retail dealers realize that the dock supply will not be sufficient this year.

Smokeless coal retains a strong position. Mine-run is selling at $1.40 to $1.50 on shipment direct from the mine. Lump and egg commands $2.25 to $2.50, the mines. Very few shipments of Hocking Valley are being received and for this reason orders are being accepted with the proviso that delivery will not be guaranteed. The circular price of $2.20, the mines, remains firm. There has been a let-up in the buying of anthracite by retail dealers and sales are made with a good deal of difficulty. Prices, however, remain about the same. Carterville operators are obtaining $2 for domestic lump and No. 1 washed coal. Raw screenings are being disposed of in this market on a parity with central Illinois fine coal. Indiana domestic lump is being sold around $1.75 and spot sales on screenings are being made at 30c. a ton. The coke market is unsteady, although no cuts in prices have been made.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$2.32	$3.05@3.30	$2.52	
Steam lump	2.02		2.07	
Egg		3.05@3.30		$4.30@4.45
Mine-run	1.87	2.40@2.55	1.87	3.45@3.55
Screenings	1.12	1.55	1.27	

Quotations on Harrisburg coal are: Domestic lump and egg, $3.05; steam lump, $2.65@2.80; mine-run, $2.40@2.55; screenings, $1.55; No. 1 nut, $3.05; No. 2 nut, $2.80. Carterville prices are: Lump, egg and No. 1 washed, $3.05; No. 2 washed, $2.80.

Coke—Connellsville, $5.50; Wise County, $5.25@5.50; by-produst, egg, stove and nut, $4.90@5; gas house, $4.90@5.

ST. LOUIS, MO.

Weather conditions unfavorable for good prices, and coal is sold at less than cost of production. Prospects not good for future. Poor market on all fuels.

The weather has been against the coalman during the past week, and if there is another week of spring weather there will be absolutely no coal market. Both domestic and steam business went to pieces and it will take two to three weeks of good winter weather to get it back to where it was before the warm wave.

Standard screenings are down to 10 and 15c. This constitutes 40% of the coal mined. The other 60%, consisting of 2-in. lump, is being sold at from $1 to $1.10. Figuring that it would bring an average of $1.05, this makes 67c. per ton for mine-run. The very lowest cost of production in the Standard field that can be figured in any way is 78 cents.

The anthracite, smokeless and coke markets are pretty well demoralized as there is no buying of any kind. It has even effected the country, and very few orders are coming in.

The prevailing prices are:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$1.05@1.15
3-in. lump	.....	.....	$1.50	.....
6-in. lump	$1.75 @ 1.90	.....	1.60	1.25@1.35
Lump and egg	1.85 @ 2.15	Over sold	.....	.....
No. 1 nut	1.40 @ 1.50	.....	.....	.....
Screenings	0.40 @ 0.50	.....	.....	0.10@0.20
Mine-run	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut	1.75 @ 1.85	.....	1.40	.....
No. 2 washed nut	1.40 @ 1.50	.....	1.60	.....
No. 3 washed nut	1.15 @ 1.25	.....	.....	.....
No. 4 washed nut	1.00 @ 1.10	.....	.....	.....
No. 5 washed nut	0.45 @ 0.55	.....	.....	.....

KANSAS CITY, MO.

Operations will have to be restricted shortly unless there is a change in the weather. Market steady but showing indications of weakening.

Unseasonable weather has held down the demand for coal in the Missouri and Kansas fields, and several mines have been forced to close down, pending the return of cold weather. Recent conditions have been unfavorable, and while yearly contracts held by several of the operating companies have tended to relieve the situation, others have not been so for-

tunate. The majority of the mines are being worked, but will be forced to cease full-time operations shortly. The market has been steady, despite the poor trade, but is expected to weaken in the immediate future unless a change in the weather takes place. The car shortage is hardly noticeable, because of the decrease in movement of coal.

PORTLAND, ORE.

Market quiet. Shipment of foreign coal the only feature of interest.

The general condition of the coal market here has shown no change during the past week. A shipment of 900 tons of coal that arrived here from Australia on the British ship "Segura" was purchased by the Pacific Coast Coal Co. Two car loads of coal from the new Monarch mine near Centralia, Wash., were received here last week as samples. Some of the product of the mine will probably be marketed here this winter.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN R.R.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of October, in short tons:

Field	Shipped	Tipple	Total	Commercial	Company
Pocahontas	1,225,803	18,681	1,244,484	1,267,615	92,431
Tug River	221,464	3,879	225,343	184,353	40,990
Thacker	247,746	9,055	256,801	167,732	89,069
Kenova	77,163	9,083	86,246	70,670	15,576
Clinch Valley	.....	.....	.....	147,980	13,824
Other N. & W	.....	.....	.....	4,709	.....
Total N. & W. Fields				1,843,059	251,890
Williamson and Pond Crk. RR.	.....	.....	.....	51,688	6,300
All Othe Railroadsr	.....	.....	.....	160,416	.....
Grand Total	1,772,176	40,698	1,812,874	2,055,163	258,190

BALTIMORE & OHIO

The following is a comparative statement of the coal and coke movement over this road for October and the first ten months of this year and last year:

	October		Ten Months	
	1913	1912	1913	1912
Coal	3,250,220	2,902,965	29,151,767	26,275,435
Coke	388,337	433,547	4,007,413	3,883,121
Total	3,638,557	3,336,512	33,159,180	30,158,556

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during October, 1913, and the first ten months, as compared with corresponding periods of 1912 in short tons:

	October		Ten Months	
Coal	1912	1913	1912	1913
Tidewater, foreign	80,812	105,523	1,175,341	1,341,910
Tidewater, coastwise	316,891	311,881	3,085,591	3,204,849
Domestic	1,542,069	1,677,545	14,787,932	15,483,089
Coke				
Tidewater, foreign	.....	3,292	52,762	30,491
Domestic	131,007	111,020	1,145,181	1,264,781
Total	2,070,779	2,209,261	20,246,807	21,325,120

FOREIGN MARKETS

GREAT BRITAIN

Nov. 14—Steam coal market conditions remain very firm for all descriptions of large. With considerable tonnage in dock and outputs limited, few sellers are in a position to accept prompt orders. Buyers are hoping that after completion of the British Admiralty's requirements, easier conditions may be in evidence. Tonnage is being delayed by stormy weather, but there are sufficient ready steamers to take all the coal available for prompt loading. Quotations are approximately as follows:

Best Welsh steam	$4.86@4.98	Best Monmouthshires	$4.14@4.20
Best seconds	4.68@4.80	Seconds	3.90@4.02
Seconds	4.50@4.62	Best Cardiff smalls	2.58@2.64
Best dry coals	4.44@4.68	Seconds	2.34@2.46

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, evclusive of wharfage, and for cash in 30 days.

Newcastle-on-Tyne (England)—The counties of Northumberland and Durham are large producers, and the output of their collieries is one of the main reliances of ships trading with the North Sea ports. Necessarily the coal strike seriously affected this neighborhood, but shipment of coal in 1912 fell less than one-tenth below the total of 1911, while it was larger than many previous years. The total shipments, foreign and coastwise, aggregated 18,681,372 tons, as compared with 20,543,683 tons in 1911, a decrease of 1,862,311 tons. A more serious effect of the strike, however, was a rise in the price of coal, which will probably be permanent owing to increased wages and shorter working hours graned to miners.

Hull ,England)—In spite of the stoppage of exports due to the miners' strike and consequent derangementc, shipments of coal abroad from Hull showed considerable increase over those of 1911. It should be remembered, however, that strike troubles in that year were responsible for considerable falling off in business.

There were exported from Hull 3,684,176 tons of coal in 1912, in comparison with 3,355,415 tons in 1911; and that shipped to coastwise ports amounted to 973,877 tons in 1912, as against 982,096 tons in 1911; coke exports were 51,091 tons in 1912, in comparison with 37,129 tons in 1911. These figures represent about one-half the coal and coke traffic on the Humber River, including the ports of Grimsby, Goole, and Immingham, which shipped coal and coke during 1912 to the amount of 9,155,937 tons, as compared with 8,758,134 tons in 1911.

Nova Scotia—From the four Nova Scotia coal fields—Sydney, Inverness, Pictou and Cumberland—nearly 7,000,000 tons of coal were mined in 1912. Approximately half of this amount was sold in the Maritime Provinces, the balance going to Quebec ports and a considerable tonnage being shipped to the United States.

Prince Edward Island (Canada)—The island's coal imports, are carried in wooden schooners, and come from Cape Breton and Nova Scotia collieries; they are increasing each year at the rate of about 8 per cent. In 1912 there were imported 70,030 tons of bituminous coal in this way; 10,562 tons of anthracite coal were also brought from New Jersey and Chesapeake ports in American schooners. Both coal and lumber are rising steadily in price.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Nov. 22:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	..	..	80	87	80
American Coal Products Pref	..	..	105	109½	102
Colorado Fuel & Iron	27⅛	26⅞	27⅛	41⅝	24⅛
Colorado Fuel & Iron Pref	....	....	155	155	150
Consolidation Coal of Maryland	....	....	102¼	102¼	102¼
Lehigh Valley Coal Sales	235	230	240	....	....
Island Creek Coal Com	47⅞	47⅞	47⅞	53½	47
Island Creek Coal Pref	83	81½	81½	85	80
Pittsburgh Coal	....	....	18⅜	24⅜	14½
Pittsburgh Coal Pref	88½	87½	87⅞	95	73
Pond Creek	19	16⅞	16⅞	23¾	16½
Reading	160½	158⅝	159	171	151⅞
Reading 1st Pref	..	..	84	92½	82½
Reading 2nd Pref	..	..	84	95	84
Virginia Iron, Coal & Coke	41	41	41	54	37

Bonds	Closing Bid	Asked	Week's Range or Last	Sale	Year's Range	
Colo. F. & I. gen. s.f.g. 5s	91	92½	92	92	92	99⅛
Colo. F. & I. gen. 6s	104	106½	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	77½	78	77⅞	78	77⅛	85
Cons. Ind. Coal Me. 1st 5s	78	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	86	92	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s	.....	..	102⅜	April '06	..	..
K. & H. C. & C. 1st s f g 5s	91	..	91	Oct. '13	91	98
Pocah. Con. Coll. 1st s f 5s	..	86	86	Oct. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s	76	78½	78	Oct. '13	73	80½
Tenn. Coal gen. 5s	97	Sale	97	97	97	103
Birm. Div. 1st consol. 6s	100⅝	102½	101	101	100⅜	103
Tenn. Div. 1st g 6s	100⅝	102½	100⅞	Oct. '13	99	102
Cah. C. M. Co. 1st g 6s	..	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	..	..	..
Victor Fuel 1st s f 5s	..	84	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s	92½	93	92½	Nov. '13	92	98

DIVIDENDS

Delaware & Hudson Co.—Regular quarterly dividend of 2¼ %, payable Dec. 20, to holders of record Nov. 27.

Hocking Valley R.R.—Regular quarterly dividend of 2%, payable Dec. 31, to holders of record Dec. 5.

Reading Co.—Regular quarterly dividend of 1% on the second preferred stock, payable Jan. 8, to holders of record Dec. 23.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

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*ELECTRICAL EQUIPMENT OF A MODERN MINE: *Pages* 843-844
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*SOME NOTES ON MINE LIGHTING: *Pages* 845-846
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CIRCULATION OF THIS ISSUE 12,250

None sent free regularly, no returns from news companies, no back numbers

Does Advertising Pay—*the Reader?*

The Weekly Ad-Talk Page

That is not the angle from which it is customary to view this "grandold" question.

In the orthodox concept of advertising it is the *advertiser* who is pictured as eternally mulling over the question—"Does advertising pay?"

But how about the *reader*?

Does it pay? Is it worth your while to make a practice, each week, of thumbing through the selling section of COAL AGE? Or is it time wasted?

You have got your own answer—and if you are reading this, we have pretty good proof as to the nature of your answer.

Perhaps the answer of the Ad Manager—who doubtless sees much more advertising and knows many more COAL AGE advertisers than you, although he lacks your buyers' viewpoint—will be of interest to you. At any rate, here goes:—

First, advertising *does* pay the reader—and pays him big. Just imagine this world *without* advertising; to focus down to our immediate question, imagine a world of coal mining newspapers sans advertising section. You wouldn't begin to be the *well educated buyer* that you are now.

You'd know one, or perhaps two products, in this line and that. You'd not know them *all* as you do now. *You'd not know enough to make a really wise buy.*

But—secondly—I'm compelled to admit that it doesn't pay the reader as well as it should pay or as it will next year and the year after.

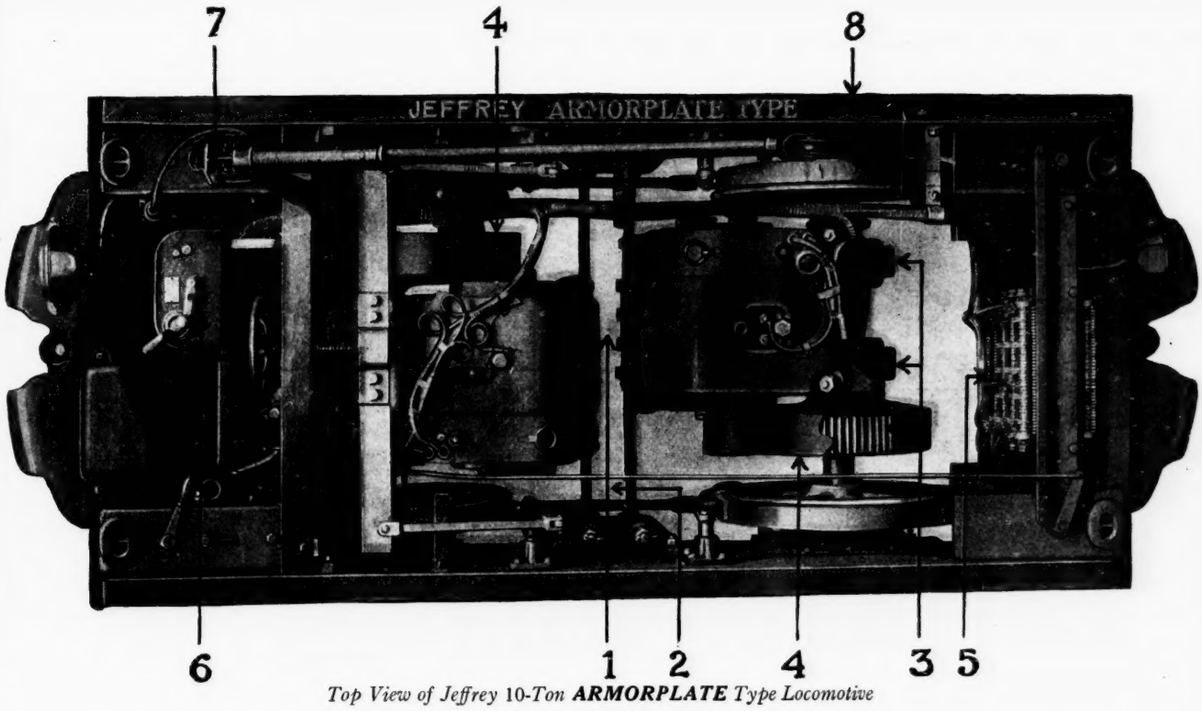
Every good ad is the product of a man with a "nose for news"—as they say in newspaperdom. And the man with a "nose for news" is simply a man with the faculty of picking out and presenting, in an attractive manner, facts and ideas that interest the reader.

In many ads there is not the news interest that there should be or could be. Ads are still all too frequently blatant reiterations of alleged superiority, loud proclaimings of statements that are not proved and that cannot even hope to interest the reader. But ads of this type are growing fewer and fewer in number.

Advertisements in your technical papers are today very much more attractive in appearance than ever before. They are more informative and better written. Hence they are interesting and worth reading.

And what has already been accomplished in this direction is just the beginning. Each year sees the percentage of dead ads decreasing and the number of live, interesting ads on the increase.

What do *you* think? Does advertising pay the reader? Take a half hour some evening and put your ideas on paper. Send them along to the Ad Manager. I'll wager that they will make a very interesting ad-talk.



Top View of Jeffrey 10-Ton ***ARMORPLATE*** *Type Locomotive*

8 Distinctive Points for Every Mine Man

Consider Carefully these Electrical and Mechanical Features of the **Jeffrey *ARMORPLATE* Type Locomotive.**

They insure **Reliability, Safety, Accessibility, Maximum Service at a Minimum of Expense.**

1. **LARGE CAPACITY BALL BEARING MOTORS.** Field Frames split on diagonal. Top half removable without disturbing other parts.
2. **MOTORS SPRING SUSPENDED,** with nose on bottom half of field frame.
3. **SEPARATE AXLE CAPS,** permitting removal of wheels and axles without disturbing motor suspension.
4. **GEAR CASE,** supported entirely on bottom half of field frame by heavy brackets.
5. **GRID RESISTANCE.** Heavy cast grids with large supporting rods built up with pure mica and copper washers and heavy malleable iron end plates. Resistance Terminals made of heavy brass, with two set screws with lock nuts.
6. **CONTROLLER.** Very liberal capacity for mining service.
7. **TROLLEY POLE.** Ball Bearing swivel base, permitting trolley pole to readily follow wire.
8. **ARMORPLATE FRAME.** Absolutely indestructible. Also permits largest motor capacity for a given weight of locomotive.

Let us demonstrate the supremacy of this type of locomotive, or, if you are not ready for this, let us send you our New Mine Locomotive Book No. 117, giving further information.

Write for our Complete Mining Catalogs and Bulletins.

10-Ton ***ARMORPLATE*** Type Locomotive hauling loaded trip

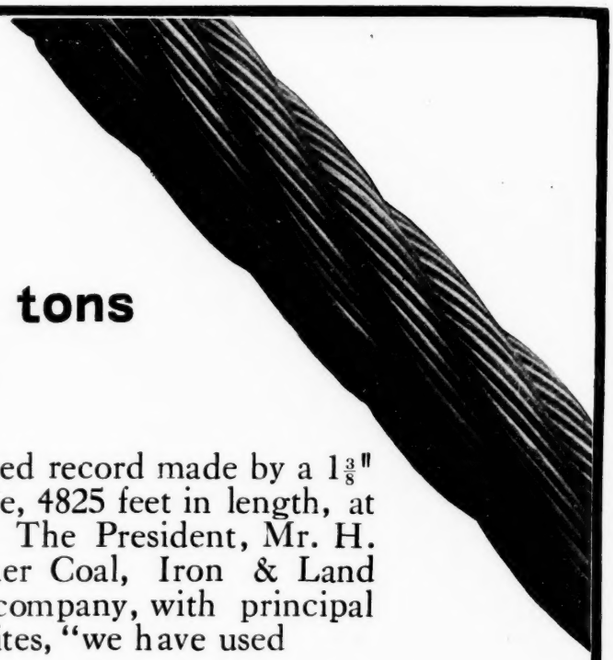
Jeffrey Mfg. Co.

Columbus, O.

New York	Charleston, W. Va.
Boston	Chicago
Philadelphia	Birmingham
Pittsburgh	Denver
Cleveland	Montreal

12-6-13

Jeffrey 28-A Shortwall Coal Cutter



WATERBURY
FOUNDED 1816

Hauled 296,407 tons in eleven months

This was the unprecedented record made by a $1\frac{3}{8}$" Waterbury Plow Steel Rope, 4825 feet in length, at a coal mine in Tennessee. The President, Mr. H. L. Badham, of the Bessemer Coal, Iron & Land Company, the operating company, with principal offices in Birmingham, writes, "we have used

WATERBURY WIRE ROPES

for several years and they have given splendid results." This is not an isolated case—we have hundreds of letters from users giving similiar testimony.

Doesn't rope service like that interest you? Let us give you the names of some Waterbury Rope users in your neighborhood and find out for yourselves what big economies are being effected through using it.

We make all kinds of Wire and Manila Rope including Waterbury Armored Rope (Gore Patent) that for some working conditions is incomparable; also Fibreclad Wire Rope, which is the ideal for Hoisting and Transmission Work.

WATERBURY COMPANY

80 SOUTH STREET, NEW YORK

Waterbury Armored Rope
(Gore Patent)

BRANCH OFFICES: Chicago, 15 So. Desplaines Street. Dallas, Texas, Powell & Ellet Co., 911 Southwestern Life Bldg. San Francisco, 113 Davis Street Boston, 220 Franklin Street. New Orleans, 810 Canal-Louisiana Bank Bldg.

Manila and Sisal Cordage
2035-W.

When Buying Your Mine Lamps Do You Figure on One or on All Three?

It is not the initial cost, the price asked for a single lamp that counts—it is the service a lamp will give. Will it give a light when wanted underground, which is all the time, and will it stand the rough usage it gets and still give a good light? These are questions which every mine owner and superintendent should have answered before buying Mine Lamps.

The principle of operation of any device must be right if it is to produce results, and to produce satisfactory results, the material and workmanship must also be of the right quality.

In the Baldwin Mine Lamp You Have the Combination of These Three

In comparison with other gas generating devices, the Baldwin is simplicity itself. The application of natural laws, water trying to seek the lowest point and being held in check by the pressure of the gas generated. As the gas is consumed the gas pressure is reduced to a point fractionally lower than the water pressure so that the water is again fed to the carbide.

The Baldwin is not made in a jobbing brass shop but in a shop where every detail is carefully studied and everything thoroughly tested. Only the very best materials are used, which enables the Baldwin to stand up to more than the ordinary service. Every process and operation in the manufacture of the Baldwin Lamp, from the making of the brass from the copper ingot, to the finished lamp is done at the one mill and factory, thus insuring expert workmanship in turning out the finished product—127 operations are necessary on each lamp to enable us to produce lamps that we can guarantee "satisfactory to you."

The many years of successful service of the Baldwin, proves that the principle of operation, the quality and workmanship are right.

Try the Baldwin and be convinced. At your Dealer's or Direct.

John Simmons Company

96 Centre Street **New York, N. Y.**

Mine Safety — in emergency and day by day

There is No Echo

Misunderstanding of signals is **impossible** from this cause, if you equip your mine with

The Everhart Pneumatic Signal Gong

The safest and most reliable means of communication between the engine room and any number of points in the mine.

All signals are repeated **simultaneously** at all stations—clear and sharp **without the slightest echo.**

Operated by pushing the plunger of an air cylinder **once** for **each** signal. Enables you to talk with any station by raising the gate slide in the speaking tube mouthpiece.

There are no wires to break, to be short-circuited or crossed by falling material. Fire or water cannot readily cause the EVERHART to become inoperative.

The maintenance expense is practically nothing.

It's the signal system **you** should have in your mine. Why not investigate?

Write for catalogs and full details today.

The Everhart Brass Works

400 Penn Ave. **Scranton, Pa.**

Your miners will want *this* acetylene lamp—

Watch the **JUSTRITE** in competition.

Just show one to them. They'll recognize the time-saving features of this improved mine lamp.

Justrite MINE LAMP

It keeps the air more pure for there's no smoke. It casts a bright light 150 feet away. It is sturdy enough to stand all hard knocks. **It has a lever feed** that does away with shaking and jarring. **It has a sparking lighter** that makes matches unnecessary. In this lamp you'll find all prejudices overcome—you'll find it a money-saver—an efficiency-promoter.

We have a trial offer that will interest every up-to-the-minute Mine Manager in the country. Write us today for complete details.

Justrite Manufacturing Company

339 So. Clinton St., Chicago, Ill.

The Electric Locomotive Has Come to Stay

And so has its high upkeep cost, too—unless you forestall that cost, that is unless you get behind the CAUSE of that cost.

The CAUSE is wear on the armature shaft; the remedy is

HESS-BRIGHT BALL BEARINGS
Built for Endurance

These bearings simply remove bearing wear from consideration. Assure a permanently perfect air gap, perfect commutation, no falling of armatures or pole pieces. They actually permit a smaller air gap, a use of less field copper.

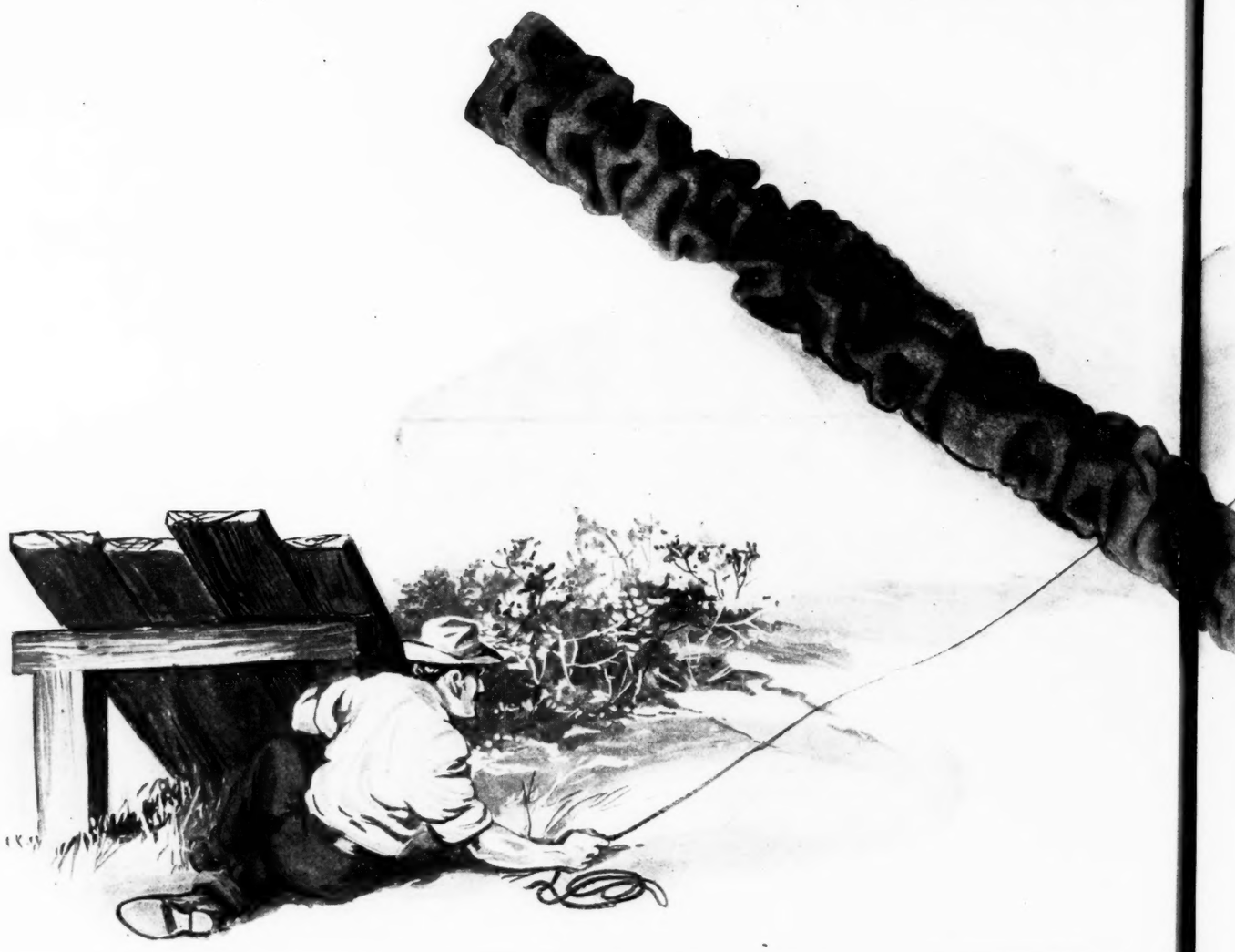
The locomotive equipped with Hess-Brights on the armature shaft will show only a small fraction of the repair bills that the plain bearing-ed locomotive shows.

Tell the maker of your locomotives to put Hess-Brights in—and be sure they are the reliable brand—Hess-Bright.

The Hess-Bright Manufacturing Co.
Front Street and Erie Avenue Philadelphia, Pa.

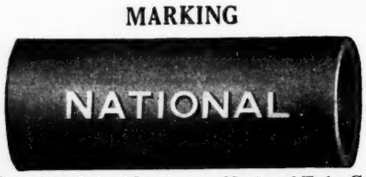
170 Quarts Of Nitroglycerine (

"NATIONAL"



¶ To readily identify "NATIONAL" material and as protection to manufacturer and consumer alike the practice of National Tube Company is to roll in raised letters of good size on each few feet of every length of welded pipe the name "NATIONAL" (except on the smaller butt-weld sizes on which this is not mechanically feasible; on these smaller butt-weld sizes the name "NATIONAL" appears on the metal tag attached to each bundle of pipe).

MARKING



Name Rolled in Raised Letters on National Tube Co. Pipe.

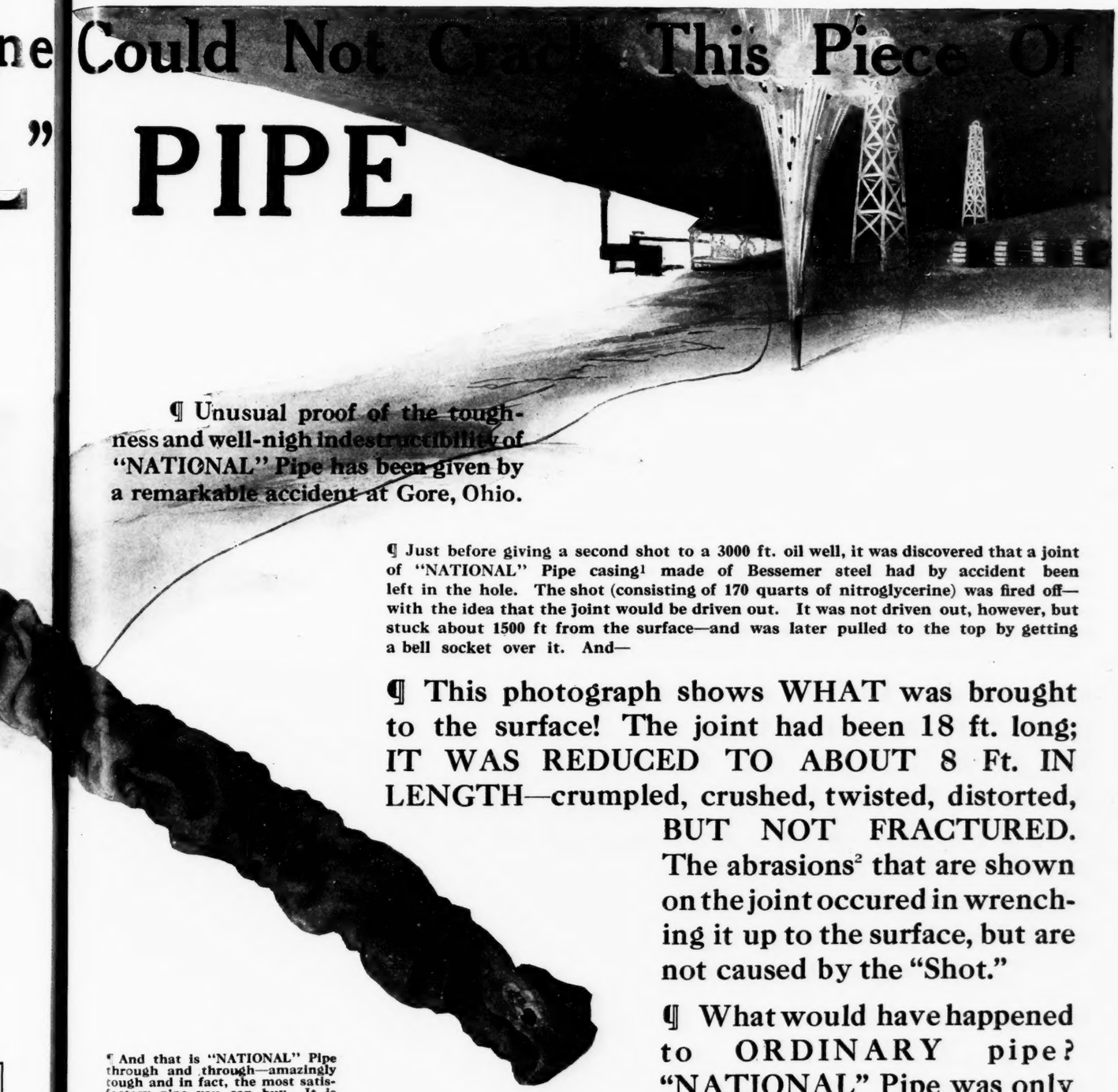
¶ When writing specifications or ordering tubular goods always specify "NATIONAL" Pipe, and identify as indicated.

¶ In addition all sizes of "NATIONAL" welded pipe below four or five inches are subjected to a roll-knobbling process known as Spellerizing to lessen the tendency to corrosion, especially in the form of pitting. This Spellerizing process is peculiar to "NATIONAL" pipe, to which process National Tube Company has exclusive rights.

NATIONAL TUBE COMPANY

DISTRICT SALES OFFICES:—Atlanta, Boston, Chicago, Denver, Kansas City, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Salt Lake City.

Could Not Crack This Piece Of PIPE



¶ Unusual proof of the toughness and well-nigh indestructibility of "NATIONAL" Pipe has been given by a remarkable accident at Gore, Ohio.

¶ Just before giving a second shot to a 3000 ft. oil well, it was discovered that a joint of "NATIONAL" Pipe casing[1] made of Bessemer steel had by accident been left in the hole. The shot (consisting of 170 quarts of nitroglycerine) was fired off—with the idea that the joint would be driven out. It was not driven out, however, but stuck about 1500 ft from the surface—and was later pulled to the top by getting a bell socket over it. And—

¶ This photograph shows WHAT was brought to the surface! The joint had been 18 ft. long; IT WAS REDUCED TO ABOUT 8 Ft. IN LENGTH—crumpled, crushed, twisted, distorted, BUT NOT FRACTURED. The abrasions[2] that are shown on the joint occured in wrenching it up to the surface, but are not caused by the "Shot."

¶ What would have happened to ORDINARY pipe? "NATIONAL" Pipe was only twisted.

¶ And that is "NATIONAL" Pipe through and through—amazingly tough and in fact, the most satisfactory pipe you can buy. It is such extraordinary instances as this, that bring out the superiority of "NATIONAL" Pipe, show the reserve strength and prove it an absolutely reliable pipe for conditions where ordinary pipe is likely to fail.

Ask for N.T.C. Bulletin No. 12A—this Bulletin has recently been enlarged and revised and contains a summary of information about "NATIONAL" Pipe—When you have read it you will keep it on file for permanent use. It's free.

1 This casing was sold through National Supply Co.

2 The holes shown at one end were drilled by the chemist to make the chemical analysis which indicated the material was Bessemer Steel.

(Gen'l Sales Offices: FRICK BUILDING) **PITTSBURGH, PA.**

PACIFIC COAST REPRESENTATIVES:—U S. Steel Products Co., San Francisco, Los Angeles, Portland, Seattle.
EXPORT REPRESENTATIVES—U. S. Steel Products Co., New York City.

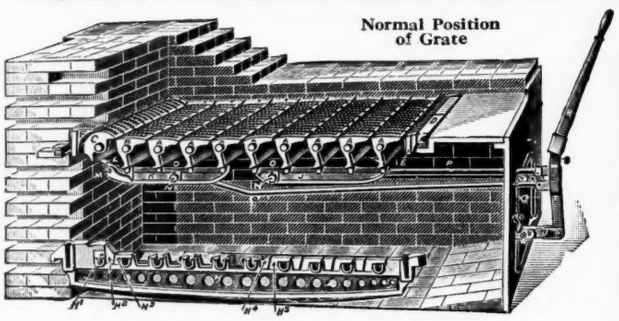
Right Fuel Bed

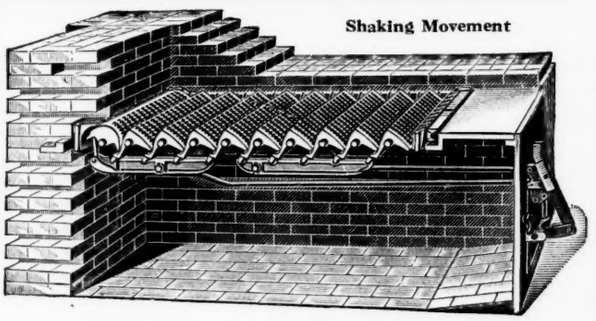
Right Draft

The Two Essentials For a Good Fire

are produced by

McClave Grates & Argand Blowers





It takes a *good* fire to burn low-grade fuel.

The reason McCLAVE GRATES and ARGAND BLOWERS are so successful in handling low-grade fuels is because the fire they make is always good.

The McCLAVE GRATE keeps the fuel bed active and alive all through, and evenly spread, with very little attention. It prevents the small stuff from sifting through unburned. It enables you to keep the fire clean with minimum work. The ARGAND BLOWER gives the fire the correct draft—not too weak, not too strong, and distributes it over the whole grate area. The result is a good, strong, clean, effective fire—*always*.

And the upkeep of this system is very low.

Sectional Top Grate Bar (McClave Grate No. 2.)

Front View—Two Sections Detached

This McClave Grate No. 2 is designed to prevent bar-burning.

The tops are cast separately in sections, the sections fitting down on the body part and being lifted off easily in case any section is burned or broken.

The tops absolutely protect the bar itself from burning. The body part is the trussed design, much stronger than the old one-piece bar.

Why not learn more about it—NOW? Catalog "H" tells. Write for a copy.

McClave-Brooks Co.

Scranton, Pa.

Branch Offices:

New York, 50 Church St.
S. C. Smith, N. Y. Manager

Chicago, 706 Fisher Bldg.
F. G. Smith, Manager

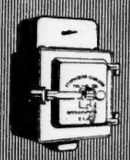
When—

When a coal-cutter breaks down—what does the machine runner do? Send his helper AFOOT down the long entry and then up to the top to look up the machinist and bring the latter back to see what's the damage? All the while the cutter lies idle?

Or is there a QUICKER way—which makes the helper's journey unnecessary, and which may make the machinist trip underground unnecessary, too?

Yes, there IS. Look around, and you'll see it.

MINE-A-PHONE



No. 898 Type

Bulletin 2600 Tells.

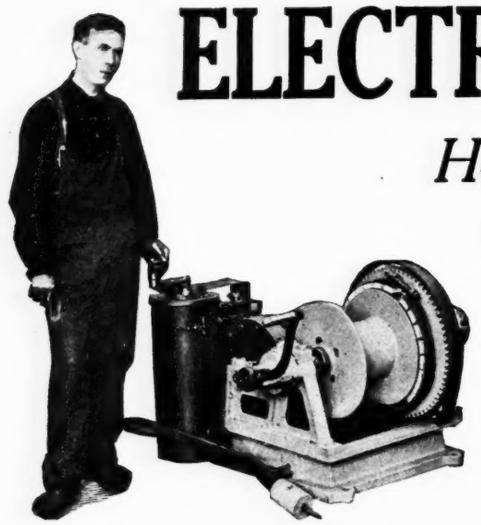
Stromberg-Carlson Tel. Mfg. Co.

Rochester, New York, U. S. A.

Chicago, Ill. Toronto, Can.

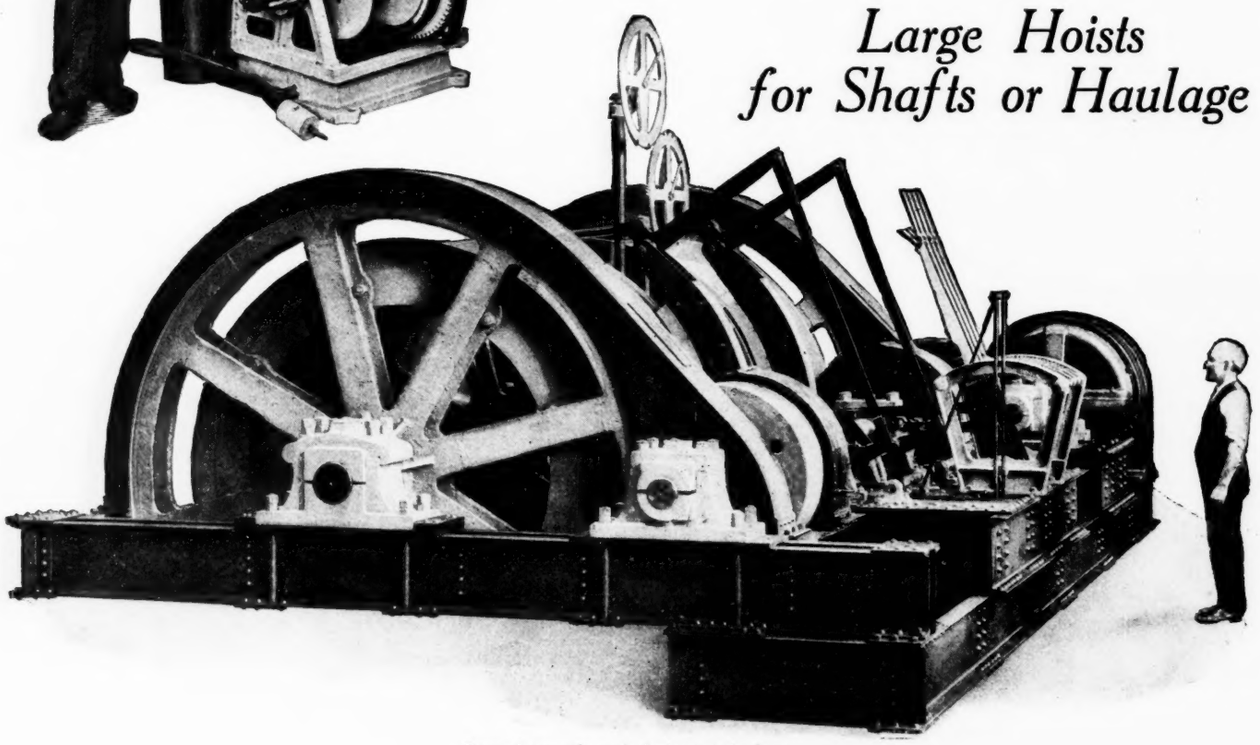
LIDGERWOOD
ELECTRIC MINE HOISTS

Hoists for Every Purpose and of Any Size



Small hoists of this type are of particular value for use inside of Coal Mines.

Large Hoists for Shafts or Haulage



From photographs made during tests in shops

Double-Drum Electric Hoist for 2000-Foot Double Compartment Shaft

DATA

Drums, each, dia. 84", Face 50", Brake Flange 96". Hold 2000 ft., 1" Rope. Drum Gear, Dia. 9' 9½", Face 9", Cast Steel. Pinions, Dia., 18¾". Double Herring Bone Cut Gear throughout. Post Brakes, V-shaped woods. Dial Indicators for 2000 ft. of Rope. Gear Reduction 16.06 to 1. Motor ITC 5017, 300 H.P. 575 R.P.M. Current 3-Phase, 60 Cycles, 2200 Volts. Bed, extreme length 15' 9½", extreme width 26' 3½". Extreme height 13' 6". Height from top of I-Beams to top of Indicators 9'. Load 5100 lbs. Rope speed 800 f.p.m. Weight of Hoist 72,000 lbs. Structural steel bed to be set in concrete up to the tops of I-beams.

THIS hoist operates in a double compartment shaft. Ordinarily it works in balance but it is fully capable of operating out of balance with the regular loads. The drum gear wheels and pinions are of cast steel. Each drum is keyed to its own shaft but can be operated independently by means of friction clutches, one on each drum gear pinion. Each clutch consists of a pair of Lidgerwood type double cone wood frictions with patented cork inserts. The frictions are forced toward each other and grip between them a V-grooved friction plate. The revolving motion of the friction plate is communicated to the pinion through a sleeve which surrounds and encloses the friction plate and frictions. The pinion is keyed upon an end of the sleeve sufficiently reduced in size for the purpose and the sleeve is bronze-bushed where it turns on the clutch shaft. The sleeve and pinion move freely endwise a sufficient distance to allow the pinion to always secure perfect meshing of the gears.

The hoist is operated through a master controller and with full contactor control. The determined time for acceleration from rest to full speed is 6 seconds.

Lidgerwood Mfg. Co., 96 Liberty St., New York

Chicago Pittsburgh Philadelphia Seattle San Francisco Portland London, England

Western-Electric

Mine Owners and Superintendents!

If you wish to better supervise your mine workings—and make the mine a safer place in which to work

"Do It Electrically"

with

Western Electric
MINE TELEPHONES

Moisture, dust and gas proof iron box telephones for the underground workings—sturdy, serviceable wooden telephones for the places above ground.

These Western Electric mine telephones have proven their value in routine and emergency work again and again—they will prove it to you.

Our distributing houses—and there is one near you—carry complete stocks of mine trolley and wiring supplies ready for immediate shipment to the mine.

Let us quote on your requirements.

WESTERN ELECTRIC COMPANY

Manufacturers of the 7,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco	Montreal	London
Boston	Savannah	Milwaukee	Oklahoma City	Oakland	Toronto	Antwerp
Philadelphia	Richmond	Cincinnati	Denver	Portland	Winnipeg	Berlin
Pittsburg	St. Louis	Indianapolis	Omaha	Seattle	Calgary	Paris
Buffalo	Dallas	Minneapolis	Salt Lake City	Vancouver	Johannesburg	Rome
Cleveland	Houston	St. Paul	Los Angeles	Edmonton	Sydney	Tokyo

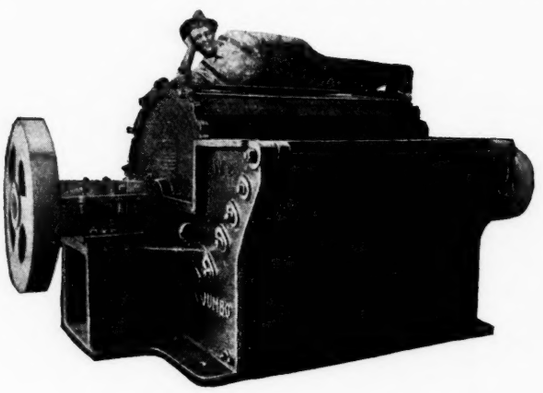
EQUIPMENT FOR EVERY ELECTRICAL NEED

Member Society for Electrical Development,
"DO IT ELECTRICALLY"

WILLIAMS CRUSHERS

2500 Williams Crushers have proved the theory's correctness—

Sixteen years ago the Williams idea of crushing was devised. The principle of building a crusher with hammers quickly adjustable to any size and to five times the natural wearing capacity, which we could thoroughly guarantee to do better work **and more of it** for the same **or less** money. 2500 Williams Crushers now operating under this guarantee have proved the theory to be even more perfect than we imagined it.



You recognize the importance of these Williams features—

The Patented Williams Crushing Movement and its adjustability assure you of these all-important points:—

Coal crushed with total uniformity—maintenance costs pulled down to an absolute minimum—coal that is **clean-crushed**—a certainty that you've a crusher that will not break down just when you need it most. You ll admit that **all** these Williams features are valuable in **your** mine.

And now consider that a Williams is a **lasting** machine—

The Wilkerson Coal & Coke Co. have been crushing 200 tons **per day since 1901.**

The Booth-Bowen Coal & Coke Co. write of their Williams installed in 1899, " the machine is still in operation and is doing satisfactory work."

"Your No. 3 crusher running night and day, Sundays and all, for nearly four years—it gives us the very best satisfaction"—Haddock's Plymouth Coal Co.

There's the evidence of Williams **lastingness**—couple that with Williams efficiency and savings and there's just **one** crusher for you—WILLIAMS.

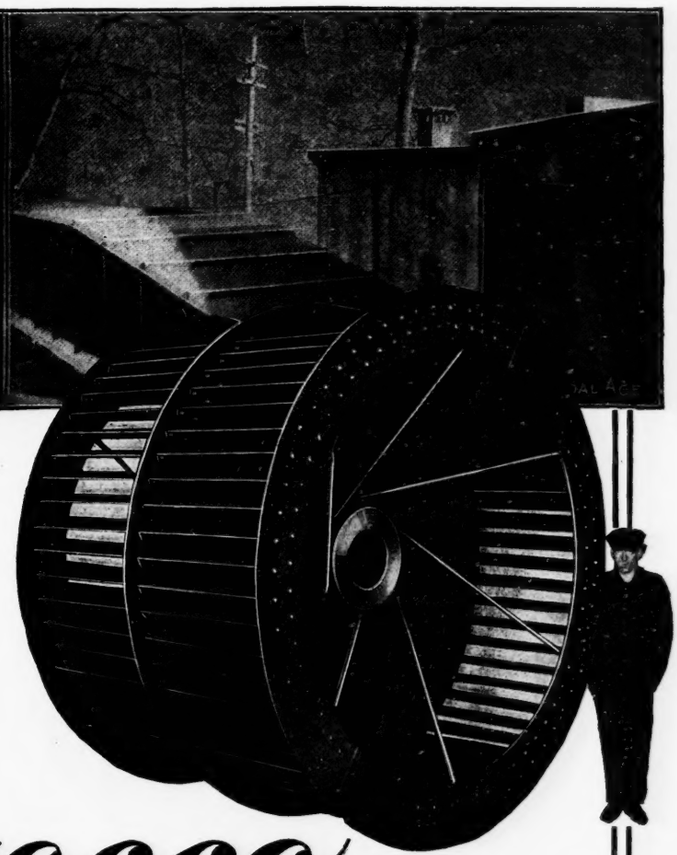
Get the Free Williams Book

The welfare of you and your mine demands that you get this interesting crusher book. Just write for Book No. 5—NOW.

The Williams Patent Crusher & Pulverizer Co.

Old Colony Building, Chicago

Pittsburgh Office: Jenkins Arcade Bldg.
268 Market Street, San Francisco, Cal.
Factory, 2701 No. Broadway, St. Louis



Extracts from "COAL AGE" Feb. 22, 1913

"The pre-eminent ideas governing the design of the ventilating equipment of the Monongahela River Consolidated Coal & Coke Company's Crescent Mines, were to provide against interruption of service —combined with the highest possible efficiency of the fan."

"In the case of this installation, each per cent. increase in the efficiency means a saving of approximately four horse power, or say $400.00 annually."

Sirocco

TRADE MARK.

SYSTEM OF MINE VENTILATION

Saves Power and Insures Uninterrupted Service

The Sirocco Fan installed by the Monongahela River Consolidated Coal & Coke Co. at their Crescent Mine—delivers 322,470 cubic feet of air per minute at 4.97 inches water gauge, running at a speed of 145.4 r.p.m. A Sirocco System costs no more to install than its imitators and the results are obtained much more economically.

Ask for the artic'e describing the above installation when you write—today— **for Mine Fan Catalogue No. 30317.**

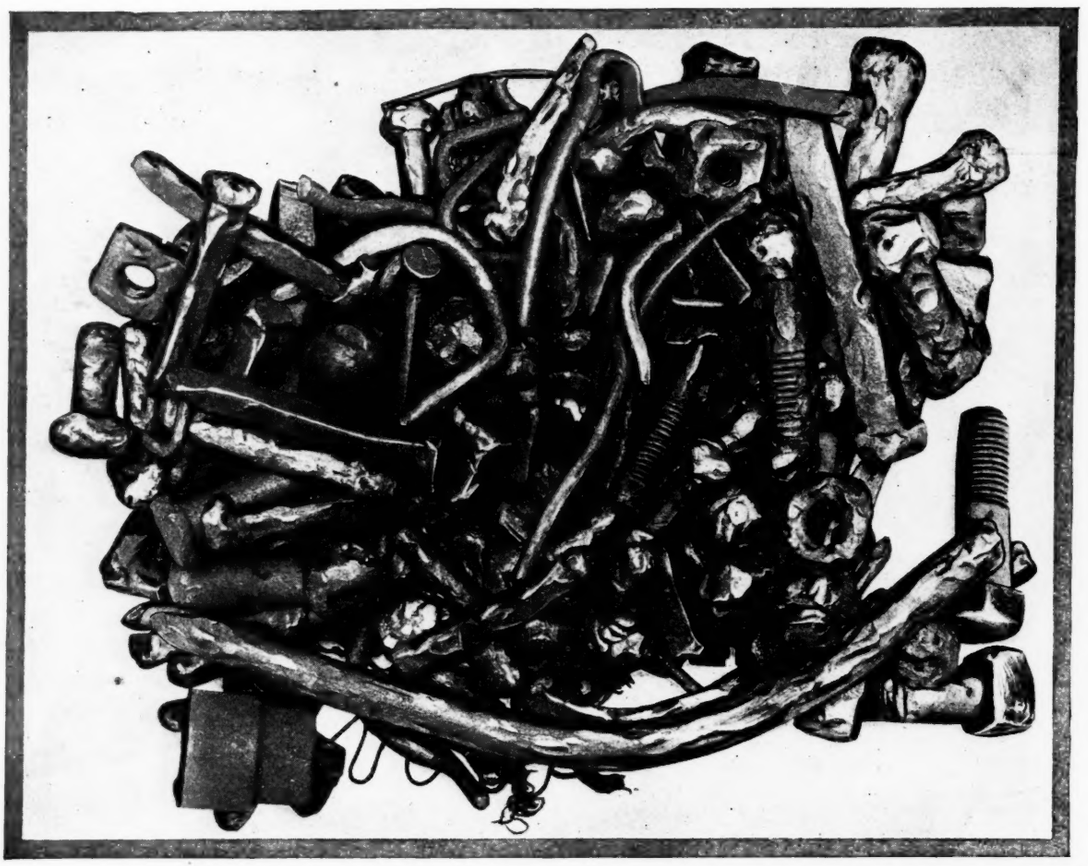
AMERICAN BLOWER COMPANY

DETROIT, MICHIGAN, U.S.A.

Branch Offices Handling Mine Fan Inquiries:

Pittsburgh—Empire Bldg.
Philadelphia—Hale Bldg.
St. Louis—Title Guaranty Bldg.
Chicago—Marquette Bldg.
Atlanta—Empire Bldg.
Seattle—Central Bldg.

"TRAMP IRON"



DELAYS MOST CRUSHERS

but it "does not shut down a 'Pennsylvania' because of the PATENT STRAY IRON COLLECTOR, located in the Crusher, which automatically traps such junk"—no mechanism, no up-keep, no power—takes place of an expensive Magnetic Separator.

The junk iron shown above was caught in the collector of a "Pennsylvania" Hammer Mill and is a fair average performance in crushing 1000 tons of coal in a large middle-west coking plant.

The "Pennsylvania" is the only Hammer Mill fitted with a "Tramp Iron" Collector "Pennsylvania" Mills have many other good points. "Pennsylvania" Bradford Coal Cleaners, Single Roll Crushers, Delamater Sink and Float Testers.

PENNSYLVANIA CRUSHER CO.

New York
50 Church Street

22 South 12th St., Philadelphia

Pittsburgh
Machesney Bldg.